THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[Registered as a Newspaper.]

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They beg special attention to the excellence and superiority of their WET and DRY METERS, several thousand being now in use by many of the largest Gas Companies in the West of England and South Wales. Warranted to measure correctly, and not to vary. Their acknowledged superiority has brought them into general use more rapidly than any Meters hitherto manufactured. A guarantee of Five years tendered with each Meter.

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It is particularly adapted for Gas-Works where Sulphate of Ammonia is manufactured.

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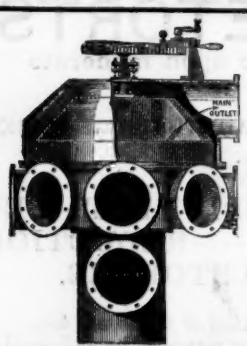
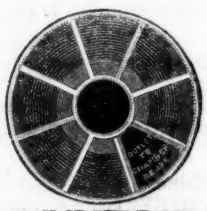
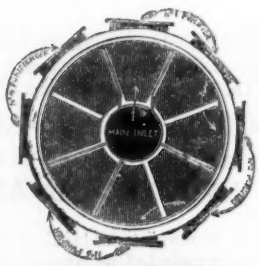
PATENT CENTRE-VALVES.



ELEVATION OF THE CENTRE-VALVE.



PLAN OF THE VALVE.



PLAN OF THE BODY.

These PATENT CENTRE-VALVES are the most perfect and certain means for working Purifiers on the system of three in action, and one out of action. The Valve itself is protected from all injury inside the safety cover. The working of the Valve is so easy, and so governed by the stop-catch movement, that the Purifiers can be instantaneously changed in the dark as well as in daylight. They are scraped perfectly true, metal to metal, the facings heretofore exposed are always covered, and there is nothing more reliable, certain, and durable in a gas-works. By their use the floor of the Purifying-house is clear and level; the Valve and all connexions being beneath the floor, out of the way of working. A considerable improvement and saving is effected in the cost of the connecting-pipes.

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THE ORIGINAL PATENTEES AND MANUFACTURERS OF THE

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FOR PURIFIERS, GASHOLDERS, BYE-PASS, AND OTHER ARRANGEMENTS REQUIRING VALVES IN GAS-WORKS.

The Faced Valves, as made by the Patentees, continue to give great satisfaction, and they are being used extensively by many of the best gas engineers of the day.

They are more easily repaired than any other kind of Valve in use, and can be re-ground in a few hours without removal, and made perfectly gas-tight.

References can be given to many Engineers of high standing, who will testify as to the favour in which they are held.

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And every Description of Gas Apparatus.

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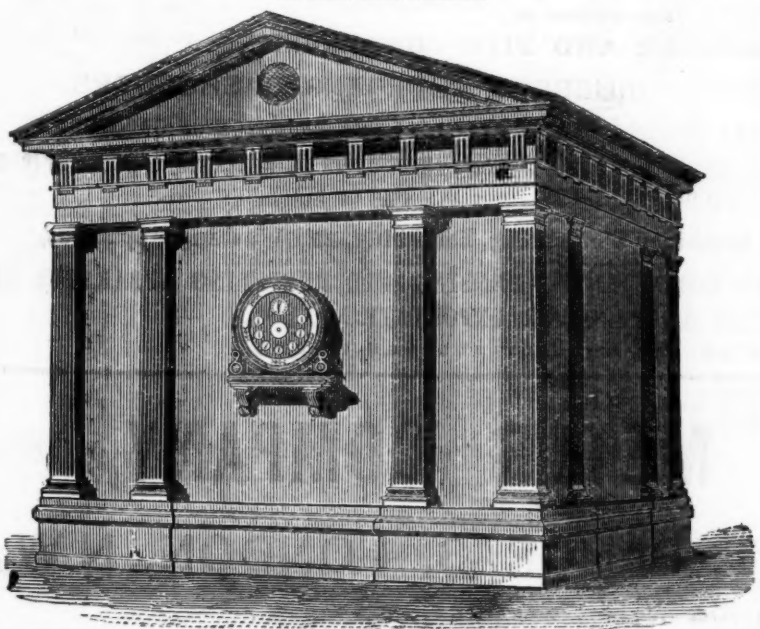

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All Sizes of CONSUMERS METERS, STATION-METERS, and GOVERNORS generally in Stock.

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All negotiations respecting M. Brémond's patented process for preventing Deposits of

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Which have now been used for fifteen years, and their advantages and durability fully established. They are made entirely by steam machinery in very large quantities at the most moderate cost.

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ESTABLISHED IN 1860.

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The only Gold Medal awarded for "Apparatus and Processes for Heating and Lighting" by the Imperial Commissioners.

MEDAL FOR PROGRESS, VIENNA, 1873.

MANUFACTURERS OF BRASS AND COPPER SHEETS,

TUBE AND WIRE,

ROLLED METALS, LOCOMOTIVE AND CONDENSER TUBES, CYLINDERS;

Ornamental, Taper, and Cased Tubes;

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GAS-FITTINGS, CHANDELIERS,

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STATION & CONSUMERS WET OR DRY METERS, STREET & SERVICE MAINS, LAMP COLUMNS & BRACKETS, & WROUGHT-IRON TUBES AND FITTINGS; WROUGHT-IRON ROOFS FOR ANY SIZE OF BUILDINGS.

Sole Makers of B. W. Thurston's Combined Condensing, Scrubbing, and Washing Apparatus,

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WET AND DRY GAS-METERS

IN BEST QUALITY TIN-PLATE AND FINE IRON CASES.

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WITH HOLMAN'S PATENT ECCENTRIC FASTENINGS,

Anti-Friction Catches, and New Self-Adjusting Cross-Bars.

Instantaneous Sealing effected. No Luting. No Duplicate Lids required.

Holman's New Self-Sustaining Cross-Bar ensures freedom of Joint, and maintains parallel position of the Lids.

Since their introduction in 1869, these Patent Retort-Lids have been thoroughly tested, being now in use in nearly all the principal Gas-Works in London and the Provinces.

T. B. and H. are now making the "Morton's Self-Sealing Lid" of the SAME FORM OR SECTION AS THE RETORT (see Illustrations above), as well as bringing the Mouthpiece from the D or Oval at back to Circular in front, as heretofore.

D and Oval Morton's Lids are working satisfactorily both in this country, on the Continent, and in the United States of America. Among others they have been adopted by the following Gas-Works:—

The Gaslight Company's Works, Fulham; Ditto, Bromley-by-Bow; Ditto, King's Cross; Ditto, Shoreditch.
And also in the Gas-Works at Richmond, Maidstone, Gloucester, Glasgow, Portsea, Roubaix (France), The Hague (Holland

HUNT'S PATENT EQUILIBRIUM GAS-GOVERNOR.

In this Governor a Throttle-Valve is substituted for the ordinary suspended Cone, all external communications being avoided by placing the Lever or Radius Arm (shown in the drawing) inside the Valve-Chamber upon the Disc. The Disc is carried upon steel centres, upon which it is accurately balanced and turns freely. The friction in working is thereby reduced to a minimum. This Governor is extremely sensitive to alterations of inlet or outlet pressure, and renders a large actuating holder unnecessary.

The principal advantages of this arrangement over the ordinary form of Governor are as follows:—

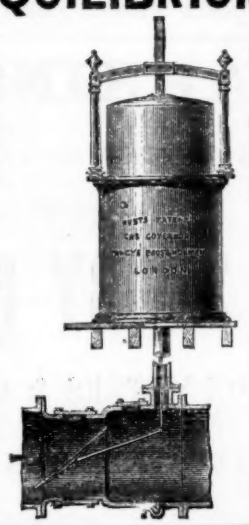
Its sensitive action prevents oscillation.

It is self-adjusting—*i.e.*, it maintains a steady pressure under variations of inlet pressure or a fluctuating consumption.

The inlet to Gasholder being contracted to the smallest possible dimensions, all danger from leakage through insufficiency of seal, tilting, &c., is entirely avoided.

The valve portion being separate from the holder, it can be handled and fixed like an ordinary Slide-Valve direct in the main; and the holder can be placed at an convenient distance immediately above it. The cost is thus materially reduced, and the inconvenience of heavy lifts done away with.

There are no working parts likely to get out of order.



These Governors have been adopted by many leading Gas Companies, among whom are the following:—

The Gaslight and Coke Co. (9), The London Gas Co. (3), and at Abergavenny, Arundel, Birmingham, Cannes (France), Devonport, Dursley, Exeter, Guernsey, Halesowen, Mentone (France), Monmouth, Newcastle-on-Tyne, Oxford, Plymouth, Rochdale, Windsor, &c.

TESTIMONIAL.

The Gaslight and Coke Company,
9, Water Street, New Bridge Street,
Blackfriars, E.C., Feb. 27, 1875.

MESSRS. TANGYE BROTHERS AND HOLMAN.

Gentlemen,—The two 24-inch and three 36-inch Hunt's Equilibrium Governors supplied by you, and fixed in the valve-rooms at Whitechapel, Goswell Road, and Blackfriars, are working very satisfactorily.

Yours truly,

(Signed) JOHN JOHNSON.

PRICES AND FULL PARTICULARS ON APPLICATION.

THE "SPECIAL" STEAM-PUMP.

Diameter of Steam Cylinder.	Diameter of Water Cylinder.	Length of Stroke.	Gallons of Water per Hour, Approximate.	Reduced Prices.
3	1½	9	450	£16
4	2	9	815	18
5*	2½	12	1,250*	20
5*	3	12	1,830*	22 10
4	4	12	3,250	25
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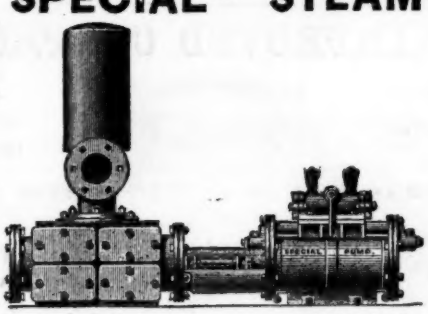
5	5	12	5,070	32 10
7*	5	12	5,070*	40
6	6	12	7,330	40
8*	6	12	7,330*	50
7	7	12	9,750	50
10*	7	12	9,750*	65



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Dublin, 1865.

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Paris, 1867.

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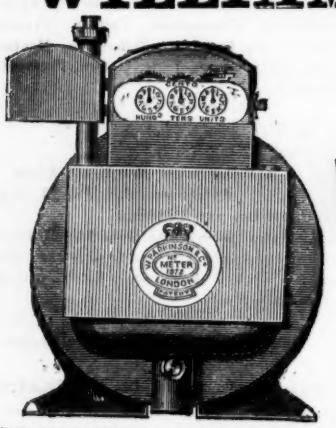
4th, Cannot become fixed by frost, however severe;
5th, Are the most accurate and unvarying measurers of Gas;
6th, Prevent jumping or unexpected extinction of the Lights;
7th, May be fixed either above or below the level of the Lights;
8th, Cannot be tampered with, without visibly damaging the outer case;
9th, Will last much longer than Wet Meters;
10th, Will not cost more than one-half for repair that Wet or Water Meters do;
Are upheld for five years without charge.

WILLIAM PARKINSON AND CO.,



(ESTABLISHED 1816,)

MANUFACTURERS OF

WET & DRY METERS,

STATION-METERS & GOVERNORS,

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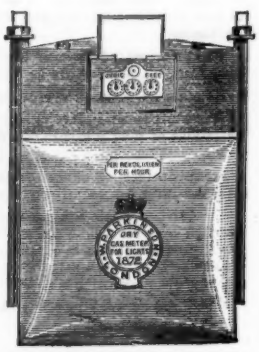

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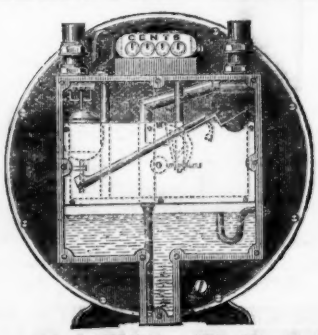

The Meter has been critically tested, and most favourably reported upon by official Meter Inspectors in London and Birmingham.

W. PARKINSON and CO. have made arrangements for the manufacture of these Meters, both in tin and cast-iron cases, and for the alteration of old ones to this principle, which is confidently recommended as possessing every quality that can be desired by Gas Companies, Corporations, or Private Consumers.

COTTAGE LANE, CITY ROAD, LONDON, E.C.

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TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion, must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.

THE JOURNAL OF GAS LIGHTING,
WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, AUGUST 13, 1878.

Circular to Gas Companies.

It may be premature to say, "Achieved is the glorious work," but we have the utmost gratification in announcing that sufficient has been done in following out the policy first suggested by the late Mr. Barlow, and since consistently and persistently advocated in these columns, to justify a hope that the general amalgamation of the Metropolitan Gas Companies will soon be an accomplished fact. We have good reasons to believe that the union of the Phœnix and Surrey Consumers Companies with the Chartered Company is already decided upon, subject, of course, to the approval of a scheme by the Board of Trade. The same may almost be said of the South Metropolitan Company, though the negotiations have not gone quite so far. It is, however, perfectly impossible that this Company can remain isolated, and stand out from the general southern combination. The financial position of the Company is undoubtedly high. They pay at the present moment the highest dividend ever paid by a Metropolitan Gas Company; but the Chartered Company, with their vast district and exceptional opportunities, are following close up, and by the last balance-sheet, which we shall presently comment upon, it is clear that they might, if so disposed, equal the dividend of the South Metropolitan Company. There is this more to be said—all the works of The Gaslight and Coke Company are in an admirable state. The wear and tear account may look large, but there stands the value in solid work.

We look upon these combinations as matters of the utmost importance. It is unnecessary now to go over again the arguments which have been constantly urged in these columns in favour of amalgamation. A uniform quality of gas is highly desirable in the Metropolis. Economy in management, with all its subsidiary advantages, is certain to follow from a general combination; and these alone are sufficient to recommend amalgamation to every thoughtful mind. But the advantages do not end here. It is quite certain that the united Company, purchasing coals in enormous quantities, could procure them at a price far below what a smaller Company would pay, even if they looked out for occasional bargains. Then there is a question of the utilization of residuals, which, worked on a very extensive scale, would be certain to be highly remunerative. For this manufacture the Chartered Company have special facilities at Beckton, where the works for carrying it on are nearly completed.

Two Companies, it will be noticed, stand out of the general combination—the Commercial and the London. The former, who ought to have amalgamated years ago, and saved the construction of what must be deemed superfluous works, will probably before long fall into the arrangement. What reasons the Directors of the latter may have for standing out are inconceivable to us. For public convenience and private advantage, it may be said that this Company, with their scattered districts, should have been the first to fall into an arrangement which would have led to the supply of their northern limits, from works on the same side of the river, with greater economy. It has always been a mystery to us how the London Company, when the districts were settled, were left with so many of what we may call outlying districts. Their central portion naturally belonged to the Chartered Company, and part of their south-eastern to the Phœnix Company; but we have no doubt that all will come right. If some petty rivalries can be satisfied, they will presently enter into the general union, and from that time forward London will have but one Gas Company.

It is hardly possible that obstacles will be thrown in the way of these amalgamations by any constituted authority. The Corporation of the City of London are not at all concerned in the matter. The Metropolitan Board of Works may perhaps raise some objections—upon what grounds we cannot imagine; but, with their usual obstructiveness, we may expect that they will protest against something or other. The policy, however, now nearly consummated, is one upon which the authorities of the Board of Trade hold a very strong opinion, and we are satisfied the consent of the Board will be readily given to any arrangements entered into between the amalgamating Companies. The scheme is not yet prepared, although the terms in two cases out of three are settled. Thus it is probable that soon after the holidays we shall be put in full possession of all the facts of this important case.

The benefits which the amalgamation will confer upon many metropolitan gas consumers will be very great. The Phœnix and Surrey Consumers Companies are still under the Act of 1860, and are legally bound to supply only twelve-candle gas. We know, however, that the quality supplied by both is far in excess of the statutory requirements. When these combinations are effected, sixteen-candle gas will be almost universal, the London Company alone remaining bound by the Act just mentioned. The convenience of having only one standard will be readily appreciated by all who consider the difficulty of obtaining fittings to consume different qualities of gas. Then as regards price. It is more than probable that the economy which will result from amalgamation will enable the united Company to reduce the charge, and so lead the way to the payment of larger dividends to the Shareholders. Looked at in whatever light—from a consumer's or a shareholder's point of view—these combinations must be regarded with approval, and all will be grateful to those who brought them about.

The half-yearly report and accounts of The Gaslight and Coke Company have been issued, in anticipation of the general meeting to be held on Friday next. It need hardly be said that the working of the past half year has been very profitable. The balance applicable to the payment of dividend on ordinary stock amounts to no less than £312,388; and as the amount required for the usual ten per cent. dividend will not much exceed £205,000, there will be a large balance to carry forward. The manufacturing statistics given in the report are favourable as usual. The quantity of coal carbonized during the half year was 540,384 tons, and the gas made averaged 10,348 feet per ton. The quantity sold was 9556 feet per ton, showing that the unaccounted-for gas was a little over six per cent. The figures are highly satisfactory, exhibiting, as they do, progressive improvement. Speaking of the Chartered Company, we may just mention that they did not dispute the sulphur

returns referred to last week, but paid the forfeiture to the Metropolitan Board as soon as it was applied for.

The Corporation of Warrington have done very well with their gas undertaking during the first year it has been in their possession. The accounts will be found in another place. They show that, after the payment of all charges, the Corporation have made a net profit of £2830. The appropriation of this sum has not, so far, been decided upon; but we should think it will be set apart as a depreciation-fund, not handed over to the Borough Treasurer to be expended on public improvements.

An Industrial Exhibition has recently been held at Wolverhampton, at which, we are pleased to see, a large number of gas-cooking apparatuses and heating-stoves formed a leading feature. The prizes, which were numerous, fell to well-known manufacturers, whose apparatuses are commanding, we are happy to see, more and more attention. A full list of the Classes and Awards will be given in a subsequent number.

Whether or not we shall have to entirely alter our system of gas-making we must wait to know, but we may notice the fact that the enterprising Mr. Stephan, of Worcester, has made an offer to the authorities at Hanley to supply that borough with gas free, gratis, and for nothing, if they will only give him their sewage, and allow him to keep the residuals from the manufacture of his gas. The offer is so tempting that it can hardly be refused by the Town Council, who will be heartily glad to turn their sewage to account. We have a strong suspicion that the gas will be worth nothing when it is made, so that the borough will obtain it at its full market value.

The Town Council of Longton have resolved on making a large reduction in the price charged for gas supplied to some of their outlying districts. The charge has hitherto been 6s. per thousand cubic feet, and at this rate it is not to be wondered at that the consumption has been relatively small. The reduction now made is to 4s. per thousand feet, and the Gas Committee reasonably anticipate a greatly increased consumption in consequence. The profits of the Corporation are so large, that the Council do not anticipate any loss from this reduction of price. The Manager of the undertaking has recently paid a visit to Paris, and investigated the merits and cost of the electric light, as used in that city for public illumination. He has stated to the Council, with no doubt sufficient grounds, that, all things being equal, the cost of the electric light is about three times that of gas. We hesitate to express any opinion, but can announce that a full and exhaustive trial is now being made of the light in the Metropolis. By recent Acts, Gas Companies have acquired the right to use patented inventions, but we may express a doubt whether the right so conferred will enable them to employ inventions not immediately relating to gas or the utilization of residuals. Gas Companies are, however, perfectly right in investigating the merits of new modes of illumination, and, should any prove of value, a short Act of Parliament will soon set all our doubts at rest.

The Gas Committee of the Manchester Corporation have been called over the coals on account of the money they have expended on the purchase of land for the new gas-works at Bradford-cum-Beswick. The first plot they purchased, which it was calculated would be sufficient for their purpose, cost £31,770. The necessities of the case, however, involved the buying of another plot at a cost of £39,270. In addition to these, it has been found essential to acquire further portions, the cost of which bring up the whole amount to £91,303. There is not the smallest occasion to make a fuss about this outlay. The gas undertaking of the Corporation of Manchester can easily bear the expense, and the new works erected upon these rather expensive plots of land will be immediately productive.

The Glasgow Corporation have had a successful year's working with their gas undertaking. The balance to be carried to profit and loss account amounts to £59,811, and with the unappropriated balance of former years it makes a total of £106,348. After paying all charges, a sum of £40,337 is left to be carried to next year's account. We will not say that gas might be cheaper in Glasgow, but these large and unappropriated balances are not conducive to economy.

The gas undertaking of the Birmingham Corporation is, as a matter of course, in a very flourishing condition. The consumption of gas continues to increase, and would increase more rapidly if the price were reduced, as might easily be done in Birmingham. We are glad to see that the Corporation have resolved on selling stoves on the hire-with-purchase system. By the use of these articles, the sale of gas will be largely promoted, to the manifest advantage of both parties concerned.

The Elland-cum-Greetland Gas Company announce a reduction of price from 4s. 2d. to 3s. 9d. per thousand cubic feet. This will give a good deal of satisfaction to their customers, and we may congratulate the Directors on the prosperity which enables them to make this concession.

A courteous communication from our friend Mons. L. Brémond announces that he has not yet completed his investigations as to the effects of desiccating gas for the removal of naphthaline. We need here hardly assure him that any communication he may send to the British Association of Gas Managers will be received with all the respect it merits. The subject chosen for investigation is a highly important one, and we shall look forward with interest to the promised papers, which, now he is established at Madrid, he may be enabled to complete.

Mr. Arthur Silverthorne, as our readers know, is a thick and thin advocate of the absorption of gas and water undertakings by local authorities. His reason is, perhaps, to be found in one sentence which we quote from the last edition of his work.* "Towns so eminently productive, in one sense, can no longer "afford to allow their revenues to flow into the channel of "private enterprise, but must employ their resources in a compen-"sative degree." We fail altogether to appreciate the force of this argument. Towns pay for the gas they consume in public lights. They have no resources but the rates, and how far it is justifiable to charge the rates of a town with the risks of a gas undertaking is still a moot point. The fact is that gas-works are uniformly successful; hence, practically, there is no risk. As a manufactured article, gas is peculiarly a matter for private enterprise. There is, we admit, something to be said in favour of the supply of water by Municipalities—that nature furnishes us with water, which is really a necessary of life. Gas is not a necessary, but is a great convenience. It is useless to argue about the matter in these days. Corporations will have gas-works when they can get them; and all we need say about this pamphlet is, that those who care to inquire into the matter of purchases will find set out, we believe very correctly, all particulars relating to those which have been made within the last ten years, together with consequences to the purchasing Municipalities.

Death of Mr. Edward White.—We regret to have to announce the death of Mr. Edward White, formerly Engineer of the Windsor Street station of the Birmingham Gas Company. Mr. White took a lively interest in the affairs of the British Association of Gas Managers, and served his term of office as a member of the Committee of that Institution. In 1871 the President Elect of the Association, the late lamented Thomas Livesey, was unable, through illness, to perform his duties, and it devolved upon Mr. White, as one of the Vice-Presidents, to take the chair at the meeting held in Dublin. By his admirable address, and by the genial manner in which he fulfilled all the engagements connected with his high position, Mr. White secured the cordial approval of his fellow-members, and contributed largely to the success of the first gas congress in the sister island. On the purchase of the Gas Companies by the Corporation of Birmingham, Mr. White retired from the position he had long held in connection with the Birmingham Gas Company's undertaking. He died at his residence, Kingston Villa, Acock's Green, on the 27th ult., aged 63, and was interred at Solihull Church on the 31st of July.

Birmingham Corporation Gas Supply.—From the report of the Gas Committee presented to the Birmingham Town Council at their meeting on Tuesday last, it appears that the sale of gas for the half year ending June 30 last, was 1,217,459,300 cubic feet, as against 1,182,284,100 in the corresponding half year of 1877, being an increase of 35,175,200 cubic feet; but taking into account the supply to Walsall, which had now ceased, and which was 25,446,000 in the half year ending June 30, 1877, the figures, had the supply been continued, would have shown an increased sale of 60,221,200 cubic feet. The total number of new services laid during the half year ending June 30 last was 1334, as against 1294 for the corresponding period of 1877. The Committee had entered into contracts for 245,750 tons of coal for the year 1878-9, and had made them on satisfactory terms. They had also made contracts for the sale of tar produced at the West Bromwich, Windsor Street, Adderley Street, and Fazeley Street works. In the present depressed state of the market they had made the contracts for one year only. Sunday labour had been discontinued at the whole of the works, it having been discontinued at Fazeley Street on the 16th of May last. The Gas Apparatus Exhibition recently held at the Town Hall was highly successful, having been attended by 16,639 visitors, of whom 4386 also attended the cooking lessons. The expenditure on account of the exhibition was £496 18s. 7d., and the receipts £353 6s. 2d., leaving £143 12s. 5d. as the cost of the exhibition. They were now making arrangements for the sale of stoves, for which the payments were to extend over three years.

Presentation to Mr. W. H. Kelly, of Melbourne.—The *Melbourne Age* of Friday, May 31 last, reports that "on Tuesday last the *employés* at the Melbourne station of the Metropolitan Gas Company took advantage of the occasion of the retirement of Mr. W. H. Kelly from the management of the works to present him with a testimonial in the shape of a handsome marble clock, as a mark of esteem. Mr. A. Ellis, the Accountant of the Company, made the presentation on behalf of the *employés*, and, in an appropriate speech, referred to the lengthened period of Mr. Kelly's connection with the Company (extending over 20 years), and to the general good feeling which had existed between him and the Officers of the Company. Mr. Kelly feelingly acknowledged the compliment paid him, and, after his health had been drunk, the proceedings terminated."

St. Helen's Gas-Works Purchase.—The Town Council of St. Helen's, Lancashire, who obtained parliamentary authority about ten years ago to purchase the gas-works of the town, have just completed a loan with the Public Works Loan Commissioners of £120,000, for the purpose of carrying that portion of their Improvement Act into effect.

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* "The Transfer of Gas-Works to Local Authorities, with the Latest "Statements and Accounts of Working under Municipal Management, "1868-1878, and the London Gas Supply, 1878, with Statements of "Capital, Increased Sale of Gas and Products." By Arthur Silverthorne. London: Crosby Lockwood and Co. 1878.

Water and Sanitary Notes.

An experiment is being made by the Corporation Water Committee of Liverpool at Bootle, which is revealing an interesting geological fact. The bore in the Bootle well now extends to 982 feet, and is still in the sandstone. It is proposed that, in order to discover the exact depth of the stratum, the bore shall be continued 500 feet further down, when it is expected that the coal measures will be reached. The yield of water at Bootle well, it is reported, continues to increase, doubtless to Alderman Bennett's satisfaction. In the meantime, the Water Committee are upon the look-out for a future source of supply, which must be had, and they are keeping their eye on the Verniew, one of the chief contributories to the Severn. We have mentioned before that the Commissioners of this river are alarmed at the prospect of the abstraction of such a large amount of water as will be necessary for the Liverpool supply, and are already taking steps to oppose the Corporation. It becomes more and more difficult to fix on a supply for any large community, and the Liverpool Water Committee are in no worse case than some other large towns.

Birmingham apparently has plenty of water, but for the moment hesitates to construct the reservoirs necessary for its utilization. The Corporation are about to go to Parliament for powers to enable them to postpone the construction of the reservoir at Shustoke for a period of five years. The Water Company, looking far ahead, obtained power to make this reservoir in 1870, and it was to have been completed in ten years. The ground was bought, but the reservoir has never been commenced. It does not seem to be required at present, for it must be admitted Birmingham is now adequately supplied, and has a good deal of water to fall back upon in case of drought. The undertaking pays quite as much as a water concern ought to pay a Corporation, but Alderman Biggs appears to be not perfectly satisfied with the quality of the water. We have never, we think, before had to correct a statement made by Alderman Avery, but we feel bound here to remark that it is not the practice of the London Water Companies, except under the pressure of dire necessity, to take water at times of flood. It is a misfortune that some of the Thames Companies have limited storeage works; hence, if the floods be continued, it becomes necessary to abstract water from the river.

An additioned water supply is projected for Scarborough, and some excellent springs have been selected at Scalby. The water is softer than that at present distributed in Scarborough, and will, when the works are completed, constitute a very valuable supply.

An additional source has also been selected for Tamworth and its neighbourhood. It is a well in the conglomerate beds lying between Tamworth and Lichfield, and the water is said to be of excellent quality. It is estimated the cost of the well, and the works to supply 350,000 gallons daily, will be £10,000; and supposing that four-fifths of the inhabitants of the included rural districts take the water, a profit of £1000 a year will be made, by means of which the debt incurred will be wiped out in the course of twenty-five years. Of course, under normal circumstances, the supply will have to be largely supplemented in the interval, and the debt will thus be proportionately increased.

In consequence of his support of the Water Company, the Mayor of Durham is not on the best of terms with his colleagues in the Council, and persistently abstains from taking part in the official proceedings. This we regard as foolish conduct. A man should have the courage of his opinions, and, when beaten, should acknowledge and submit to his defeat. The Mayor could better have assisted the Water Company by remaining at his post and performing his public duties, not unmindful, at the same time, of his practical obligation to support the Water Company. As it is, the Council, without the Mayor's assistance, are casting about for a new source of supply. We have said before, that competition with the Water Company is altogether out of the question. The source of the water may be changed, but the supply must still remain in the hands of the Company; and the worthy Mayor could best serve their interests by remaining at his post, and doing his utmost to guide public opinion.

Revival of the Thirlmere Scheme.—Last Saturday's *Manchester Guardian* says: "A meeting of the City Council is to be held on Wednesday next, 'to consider, and, if thought expedient, to approve of and direct the promotion by the Council in Parliament of a Bill for the purpose of empowering the Corporation to obtain a supply of water from Lake Thirlmere, in Cumberland, and for other purposes; the costs and expenses of such promotion to be defrayed out of the public funds or rates in the hands of the Council, or hereafter to accrue to them on water-works account.'"

Correspondence.

[*We do not hold ourselves responsible for the opinions expressed by Correspondents.*]

A NEW STANDARD FOR DETERMINING THE ILLUMINATING POWER OF GAS.

Sir,—In your last issue you publish, in the form of a letter, some further observations of Mr. Hartley's on the paper I had the honour of reading before the British Association of Gas Managers.

Mr. Hartley commences by asserting that the more he thinks about the proposed standard, the more he becomes satisfied that it is untrue in theory and untrustworthy, and proceeds to quote from my paper a sentence which fairly represents the gist of my subject—viz., that I "had discovered that portions of flames of gases of varying qualities, ranging in illuminating power between 15 and 35 candles, consumed so as to effect perfect combustion, are equal in illuminating power." Starting with this quotation, I was hopeful that Mr. Hartley intended to enlighten us on the theory of the subject; but such is not the case, the quotation above is not referred to at all, and attention is directed to a set of experiments recorded in Table I. of my paper. These experiments, my paper states, were made with a view to determine the best portion of the flame to take for my standard, and the investigations convinced me that I must certainly avoid taking it in a horizontal direction. I, therefore, adopted a vertical aperture in the screen, embracing a portion of three horizontal spaces the relative value of which my experiments informed me. Now, with all due respect to Mr. Hartley's theory, I think he has failed to prove that it is impossible to place the vertical aperture in such a position with regard to these three horizontal spaces that the results from both flames shall not be equal. If Mr. Hartley's theory is correct, the practical results obtained by the photometer represent the opposite view, and if there is in reality a different power of light transmitted through the aperture from the two flames, the photometer is not a sufficiently delicate instrument to detect the difference.

One word about Mr. Hartley's reference to the flame of an Argand burner. I presume the Referees standard burner is referred to. I can scarcely dispute the fact we are asked to remember—"that *the edge* of the flame extends *all round*;" but I dispute the assertion that it is "the circumference of a cylinder." The diameter of a flame from an Argand burner is greatest at its point of maximum intensity, and decreases both towards the burner and the end of the flame, causing the alteration in the width of the flame referred to in my paper. The bright edge of the flame, I contend, notwithstanding the fact of its being "all round" the flame, is distinctly visible in the form of a flame from a jet on either side, and the brightness of this jet is considerably greater than the central portion of the flame; and, in addition, it is not a cylinder; therefore I think I am justified in attributing variations to this cause also.

Leaving the broad question, Mr. Hartley refers to one or two other minor parts of the paper, one of which I will only mention. Mr. Hartley does not believe in determining the value of gases of varying qualities by the height of their flames, although, under certain conditions, the jet photometer is pronounced to be, in all its varieties, for approximate determinations, a most valuable instrument. I suppose, if it possesses value at all, it must be in its power of determining the quality of gases by the height of its flame. This admission of value in the case of the jet ought surely to extend to the Argand flame, constituted as it is of a series of jets. Mr. Hartley does not attempt to explain his theory on this subject, neither does he establish any theory to prove that the constituent parts of the flame of 15-candle gas should vary from those of the flame of 35-candle gas consumed through the same burner, perfect combustion being established in each case.

I must apologize to you, Sir, for the length of my letter, and hope that it will not provoke any further correspondence, as I have no desire to rush into print; but as the matter is so simple and easily tried, I have only to ask any of your readers who feel interested in the subject to try it, and judge accordingly.

John Methven.

London Gaslight Company, Nine Elms, S.W., Aug. 10, 1878.

NAPHTHALINE.

Sir,—On returning home after a few days absence, I find, in your Journal of the 23rd of July last, a letter from Mr. R. Tervet, to which I think I ought to reply, if you will allow me to do so.

First of all, it will give me an opportunity of thanking Mr. Corbet Woodall, the President of the British Association of Gas Managers, of which I am proud to be a member, for having been good enough to notice, in his Inaugural Address, the work which I last year laid before the Société Technique de l'Industrie du Gas en France. I do this with so much more gratitude because his praises were addressed to a foreigner, which is to me a proof of justice and impartiality.

I did not reply to the last letter you published from Mr. Young, because it was inconvenient to me to follow the discussion on the ground upon which it was laid by my adversary, unless my slight knowledge of the English language has caused me to misinterpret its meaning, which I should very much regret.

I have never pretended to refute the laws established by my venerated and regretted master, M. Regnault; the law which I have formulated is simply quite distinct from them. Mr. Aitken's process, defended and extolled by Mr. Young, is a confirmation of it; and my contradictions furnish an argument in favour of this law, which they attack. Your readers well know what these gentlemen's process consists of. They manufacture the gas in a manner peculiar to themselves, and then enrich it with hydrocarbon vapours. Now, in order that the gas thus enriched may retain these vapours in solution or in suspension, as may be wished, it is necessary that it should be deprived of all aqueous vapour, because, if the gas is not dried, when the aqueous vapour condenses, the enriching vapours which it has been caused to take up condense also. Is not this a proof that what I have laid down under the form of a physical law is verified—that "when, in a mixture of vapours, one of them attains its point of condensation, the point of condensation of the others is changed also"? And is this law the con-

tradiction of the law of the mixtures of gases and vapours, or of the mixtures of vapours, so well established by M. Regnault? No.

With regard to naphthaline, in these gentlemen's process there is no allusion whatever to it—the word is not even mentioned—and the object of their patent is not to rid gas-pipes of this deposit. It is therefore unnecessary to discuss the priority of the patents. These gentlemen and I employ a similar process—that of the desiccation of the gas—they, in order that the particular gas they manufacture may be enabled to retain the essential and enriching vapours which they cause it to take up; and I, in order that the solid naphthaline, which clogs up our pipes, may be prevented from being deposited therein, and obstructing the passage of the gas.

I now come to the illuminating power. Unfortunately for me, Mr. Aitken discovered before I did that the desiccation of gas increased its illuminating power. But unfortunately also for Mr. Aitken, who, I believe, found this out in 1873, the London Gas Referees discovered it in 1871. So that what I thought I had discovered in 1877 was already known in 1871. I confessed my regret at this in the paper you were good enough to publish, and I ascribed the honour to those skilled engineers who, before Mr. Aitken and myself, established this fact, which I believed was unknown.

Finally, in reply to Mr. Tervet, I may say that my studies are not yet finished. Unfortunately, they have been interrupted by a change of situation and country; but I hope to be able, at next year's Meeting of the British Association of Gas Managers, to furnish additional results and further explanations, which my undertaking the management of the Madrid Gas Company did not allow me to give this year, as it prevented me from attending not only the meeting in London, but even that in Paris.

Madrid, Aug. 5, 1878. L. Brémond.

GAS COMPANIES AND ALTERATIONS IN STREET-LAMPS.

Sir,—Having had considerable experience in London, with respect to the alterations of pipes referred to by "Secretary," in your Journal of yesterday, I beg to state that it was the practice of the Company with which I was connected to charge the cost of the necessary alterations of main or service pipes to the Local Authority causing the level of the street to be raised or lowered.

By section 98 of the Metropolis Local Management Act, 1855, the Local Authority have the power to "alter the position of any mains or pipes" when the level of a street is raised or lowered; but such alteration is subject to the approval of the Engineer to the Company. I do not remember any instance in which the Local Authority elected to alter the mains themselves, or in which they disputed the right of the Company to be paid for the alteration, and I see no reason to doubt that the Provincial Authorities would follow the example of those in the Metropolis, and pay a reasonable amount for alterations made for their convenience. Thomas Hersey.

21, *Abingdon Street, Westminster, S.W., Aug.* 7, 1878.

REGISTRATION OF PROBATES, ETC.

Sir,—Permit me through your columns to direct attention to an inconvenient practice of the Probate Division of the High Court of Justice. When probates or letters of administration are granted, the executors or administrators are only *named*, with perhaps the relation to the deceased. Now it is the practice—and a very proper one—before issuing these important documents, to require *in all cases*, on affidavit, the full names, descriptions, and addresses, of the executors or administrators. It would be difficult to exaggerate the very great inconvenience which results from the omission of the Registrars to transfer these necessary particulars to the document issued by the Registry, and much expense and trouble would be saved by the adoption of the opposite simple and common-sense proceeding; to say nothing of the safeguard, as regards accuracy and prevention of fraud, which would be thereby secured. The matter is of considerable interest to banks, railway companies, municipal corporations, and, in fact, in all important forms of investment. The probate of a will has frequently to be produced and registered at 20 different places, and in each case these particulars are required—frequently with statutory declarations attached—when it is obvious that they ought to appear upon the proper and authentic document—*i.e.*, upon the probate itself.

Town Hall, Manchester, Aug. 7, 1878. Joseph Heron, Town Clerk.

Huntingdon and Godmanchester Gas Company.—The annual meeting was held on Wednesday, the 7th inst.—Mr. A. Ashton in the chair. The Secretary read the Directors report, which stated that the receipts during the year ending the 6th of July last (which were principally for gas and coke) were somewhat less than in the preceding year. This had doubtless arisen from the reduction in the price of gas made in September last, coupled with the fact that almost all the inhabitants requiring gas had at that time become consumers. By the exercise of continued and vigilant economy in the management of the works, the expenses of the Company had been reduced, and adding the amount of profit left in hand undivided on July 6, 1877, to the profit of the past year, the Directors were able to pay a remunerative dividend. The balance-sheet showed £1589 13s. 11½d. available for a dividend of 9 per cent.; £200 would be added to the reserve, and the balance would be carried to the credit of the current year. The Directors who retired by rotation, and who were eligible for re-election, were Messrs. W. Cluff, John Seaton, E. C. Bull, and R. Bates. The Chairman moved the adoption of the report, which was seconded by Mr. Foreman and carried unanimously, as was also the re-election of the retiring Directors. Mr. Howson proposed a vote of thanks to the Chairman, and congratulated the Shareholders upon the state of the Company. The price of gas was, he said, less than at St. Ives and St. Neots, and it had been reduced since the last meeting, yet the Shareholders had a good dividend, a result owing in great measure to the great attention the Chairman had paid to the *minutiæ* of the Company's business. Mr. Foreman seconded the proposition, which was supported by Mr. Provost. The Chairman, in acknowledging the vote, said he had little to do, and was ready to devote his time to the service of the Company. He paid a tribute to the Manager, who rendered valuable service to the Company when the men struck work, by sitting up all night to charge the retorts, but for which the town would have been left in darkness through the failure in the supply of gas.

Parliamentary Intelligence.

HOUSE OF LORDS.

Thursday, Aug. 8.

The Public Health (Ireland) Bill received the Royal Assent.

HOUSE OF COMMONS.

Wednesday, Aug. 7.

A Statement of the Accounts of the Metropolitan Water Companies for the year 1877, prepared in pursuance of the Metropolis Water Act, 1871, was presented.

HOUSE OF LORDS COMMITTEE.

Friday, July 20.

(*Before Earl* Spencer, *Chairman; the Duke of* St. Albans, *Earl* Bathurst, *Lord* Wrottesley, *and Lord* Truro.)

DURHAM WATER BILL.

(*Concluded from p.* 201.)

Dr. *Alfred Hill*, examined by Mr. Venables.

I am a Fellow of the Institute of Chemists, Medical Officer of Health and Public Analyst to the Borough of Birmingham, and formerly Professor of Chemistry and Toxicology in Queen's College, Birmingham. I have for many years, in those capacities, paid great attention to the question of water supply, as well to the medical part as to the chemical part of it. I have visited Durham for the purpose of gaining information about this question, and inspected the Wear and the neighbouring streams on Friday and Saturday, the 12th and 13th of this month. I have heard the evidence of the various witnesses about the particular streams; and, as far as my inquiry has extended, I found that these streams were all more or less polluted, and I had distinct evidence of sewer-pipes discharging themselves into the various streams.

Mr. Venables: It has been suggested, and I have no doubt the fact is so, that this is not a water-closet district. Does it follow, from the absence of those water-closets, that there is no foul sewage flowing into the stream?

Witness: Certainly not. You cannot prevent the district draining itself by natural means; and the fact is, it has been ascertained by analysis that the sewage of a midden town is very little, if any, better than the sewage of a water-closet town.

Examination continued: Colliery water, as such, simply from a colliery not in working, may be very good; but colliery water from a colliery in which there are a number of men and horses employed is certainly totally unfit for use. I took samples of the water for analysis, and my analysis is considerably worse than Dr. Tidy's. There had been showers of rain on the day before I took the samples, and that very possibly may account for the difference; all I can say is, that the water opposite the pumping-station, in the sample I took, contained 0·0012 of ammonia, which is very high; that from the fountain and the main of the Company contains 0·004—that is rather high too; but the matter seems to have been improved, partly perhaps by storeage, and partly by filtration. I understood Dr. Tidy to say that the water would not be worse after rain. I think it would, because any lodgments in the pipes or drains or sewers would be washed out by the fresh water, and the surface of the ground too would have its impurities washed off. In some of the samples there are large quantities of chlorine—3·8 delivered from the main, and 4 in the river opposite the pumping-station, so that it has not undergone much diminution; that is a large quantity of chlorine. I should imagine that chlorine only would not amount to more than 1 in the upper parts of the river, and I look upon these quantities of chlorine in the water delivered as being very much too high, and as indicating urine pollution. There was also a large quantity of ammonia, and then the total of the solid matter indicates pollution—that is, 54 parts in 100,000; whereas the London water contains between 20 and 30, and the Birmingham water about 23 or 24. I think these waters are most unsafe and undesirable.

Mr. Venables: Can you form a conclusive judgment of the quality of a water suppiy by chemical analysis?

Witness: You can form an opinion, certainly; for instance, if you find a large amount of nitrogenous matter in it, you may be quite sure that the water is organically polluted by animal matter, but you cannot tell whether the pollution is in the normal state of healthy sewage and nonl injurious, or whether it is infected sewage, and positively poisonous.

I believe it is the fact—you used the phrase just now, healthy sewage—that healthy sewage is not in general dangerous, although it may be disgusting?—It may be drunk over and over again with impunity.

Do you consider that it is desirable that even healthy sewage should be discharged into water which has to be used for drinking?—Certainly not; it is filthy and disgusting, and is no doubt conducive to such diseases as diarrhœa and intestinal disturbance. There is plenty of proof that water so contaminated has, on occasions, produced the most disastrous effects.

Examination continued: We have no chemical test by which to distinguish pollution by healthy sewage and pollution by sewage which is tainted with typhoid and cholera. Consequently, what was innocuous on one day from healthy sewage might, if the inhabitants sending out that sewage were affected with an epidemic, become immediately dangerous without any increased chemical impurity, or even, perhaps, with a diminution of impurity. I do not agree with Dr. Tidy that there is no such thing as a specific infection conveyed by what are called germs of disease, and it seems to me that his statement is totally opposed to the investigations of modern physiology; totally opposed, because we know very well that the germs left in infected liquids have been distinctly separated and seen. There is evidence of some diseases following the course of a river and being apparently traceable to water. A very good illustration of that is the case of the two Companies, the Lambeth and Southwark and Vauxhall. In 1849 those two Companies drew their supply from the Thames, below Battersea Bridge—that is, within the tidal influence—and the sewers of London naturally had their contents backed up into the water supply. In 1849 both the districts of London supplied by those two Companies had very severe visitations of cholera. In 1854, the next visitation of cholera, the Southwark Company continued to draw water from the same part, and there was again a severe epidemic visitation of cholera; but in the meantime the Lambeth Company had changed their source of supply, and had taken it from above Teddington, and it is the fact that the district now supplied by the Lambeth Company had the disease very mildly indeed—in fact, it almost escaped. That is clear evidence to my mind that the pollution of the river was the cause of the diffusion of the cholera. Again, there was an epidemic in East London in 1866—one of the reservoirs of the East London Company was known to have become accidentally polluted by some infected matter having got into it from the River Lea. The case was fully investigated by one of the Medical Inspectors of the Local Government Board, and it was clearly proved that the Lea was infected by cholera discharges, it was proved that Lea water had got into reservoir, and it was proved that wherever that water was delivered in East London the cholera was coincident with the supply. If that water

had been analyzed, no chemist would be able to know that there was cholera infection; he would find just as much organic nitrogen as if it had been simply so much inert matter mixed with the water. It is not cognizant by the senses, nor by chemical analysis. In 1866 there was also an epidemic of cholera in Sheffield, and the Don runs from Sheffield down to Doncaster. The epidemic existed at much the same time in Sheffield and Doncaster; but it lasted a fortnight longer in Doncaster than in Sheffield. The Doncaster people drink the Don water, and all the sewage was emptied into the Don. They had the cholera at the same time, and it lasted with them a fortnight later. No doubt that fortnight answered to the period of incubation during which the polluted water would have to produce this effect.

Mr. VENABLES: Mr. Hawksley expressed an opinion (I think I can give it nearly in his words that he accepted from me) that if you pour about one-twentieth of the volume of a river consisting of sewage into it and let it flow for twelve miles, the pernicious elements are destroyed. What is your opinion of that?

Witness: I have not made any experiments myself upon that subject, but I will admit this, that the water will become clear and bright, because it will deposit all its suspended matter, but that is no proof whatever of purification, because we know very well that the germs of disease are so minute that they do not subside in the stream, and they pass through a filter; and we also know this, that in eleven miles, as proved by Dr. Frankland's experiments on the Irwell, the dissolved matter does not diminish at all; it is the dissolved matter that we should look for, and these germs are so light that they would not subside, and they are so small that they would not be stopped by a filter.

Examination continued: Dr. Frankland has investigated this subject for years, and has published largely upon the matter. I consider him a very great authority upon the question. Dr. Frankland strongly holds the opinion I have expressed, that these germs are not destructible by the process described, and that they also elude chemical analysis. He has always, in accordance with those views advocated the rejection for a domestic supply of water into which sewage is discharged. The mere fact that at a particular time there was no disease caused by sewage, would be quite consistent with the danger of the disease being carried, if there were an epidemic higher up the stream. No doubt the people of Durham may drink the somewhat refined sewage of the people of Bishop Auckland, but if Bishop Auckland were to get typhoid fever or cholera, and the discharges were to get into the river, I think it highly probable that the people of Durham would suffer from the epidemic, or, if not, they would have individual cases of disease. And even where the sewage does not produce the infection of any specific disease, I am of opinion that the water is not as wholesome as if there were no sewage. I believe that it deranges the digestive organs, and produces diarrhœa and other symptoms. I gave evidence to somewhat the same effect this very session, when there was a proposal to supply the town of Cheltenham from the Severn. The whole matter was then gone into, and I think that Mr. Hawksley and Dr. Tidy expressed the same opinions that they have expressed here, and the result was that the Bill of the Company, seeking powers to take water from the Severn, was rejected.

Cross-examined by Mr. MICHAEL: In that inquiry I believe that there was an alternative proposition from the Corporation to buy up the Water Company, and bring in a supply of their own. In some cases there is no doubt that disease does travel up a river. I am unable to say that it is the fact that one of the epidemics of cholera travelled up the river and not down it, but I am free to admit that cholera often goes up the river. There are, however, two modes by which it can be conveyed—it may be conveyed down the river by the water, or it may be conveyed up the river by boats. If it was conveyed by water, I should have expected that the disease would have flowed from the source to the mouth of the river. With regard to the East London case, it is the fact that the Medical Officer of Health for the City of London arrived at a conclusion exactly different from that which I have given to the Committee; but it is also the fact that Mr. Netten Radcliffe, one of the Government Inspectors, when it was put into his hands, arrived at exactly an opposite conclusion, and he was corroborated by Dr. Farr. I read the evidence on both sides, and I must say that I take the view of Mr. Radcliffe. Chloride of sodium in rivers is generally derived from urine. If I found a river in its upper uncontaminated portions containing less than one part of chlorine, and if I found that the river below, 25 miles down, contained eight or twelve parts of chlorine, or any other larger number, then I should conclude that the chlorine had come in from the pollution which the river had received by sewage; and sewage consists very largely of urine. I have not taken any trouble to inquire whether there was any salt spring in the river close to the Houghall Colliery. The important points in chemical analysis which I consider determine the purity of water are the total solid matter, the organic carbon, the organic nitrogen, and the ammonia, the nitrogen as nitrates, if there are any (and I may say that there are none in this case, which I look upon as against the water), and chlorine. I found no nitrogen as nitrates or nitrites, and this I think is a bad sign, because all ordinary rivers which yield good potable water contain nitrogen as nitrates or nitrites, and I think the reason why it is not found here is this: It is that the recent sewage in the river is oxidyzed at the expense of the nitrates, so that the nitrates are made to disappear. This water is very much worse than the water supplied at the present time to Birmingham, where we have about 24 parts of solid matter in 100,000. Here there are 54 in the fountain water, and 63 in the water from the pumping-station; and while we have two parts of ammonia in the Birmingham water, there are twelve here at the pumping-station, and four at the fountain. While we have 1·3 parts of chlorine in the Birmingham water, there are 4·0 here at the pumping-station, and 3·8 at the fountain. Dr. Tidy's results are far more favourable than mine. I presume they were taken under more favourable circumstances.

Mr. MICHAEL: You have not taken yours filtered?

Witness: I have from the fountain.

Mr. VENABLES: The fountain water is the Company's water after passing through the filter?

Witness: The fountain is a place in Durham, I believe, at which the water was drawn from the main by Mr. Richardson.

Mr. MICHAEL: You do not know whether there is a cistern at the fountain?

Witness: I do not.

I will ask you this, does not the fact of a cistern being present in a water supply tend very materially to vitiate the results that you obtain from analysis?—Very likely; sometimes cisterns become contaminated and impure.

Mr. *Thomas William Keates*, examined by Mr. BIDDER.

I am Consulting Chemist to the Metropolitan Board of Works and the River Lea Conservancy Board. I have been in practice as a consulting and analytical chemist for 30 years. I was asked to visit Durham in the course of this month, for the purpose of examining the water supply and the sources of it. I visited Durham on the 12th and 13th. I went over a considerable part of the valley of the Wear, and examined the different tributaries up to Witton. The result of my observations upon the spot has certainly not led me to concur with the statements of Mr. Hawksley, that there are no traces whatever of pollution along the Wear. I examined the state of the river at the place where the Water Company take their water, and I took a sample. The water there had a very bad appearance when I was there; it was covered with flecks of dead-looking froth, and it was very sluggish and polluted. I found that the intake of the Water Company was about 65 feet below the drainage from one of the collieries. At Bishop Auckland sewage was running into the Wear near the railway viaduct. There was a 12-inch pipe about half full of sewage, very much diluted with water. There is a second point at which the town is drained into the Wear, 150 or 200 yards below the point I first mentioned, but I could not get to see very much of it. As at that point the pipe is almost in the middle of the river, but where the sewage runs in from the first pipe, I may say that the bank of the river is in a very bad state—it is covered with sewage and mud, stinking badly, and giving off gas. There were three other points I saw, but they were all very much of the same description, and all draining into small becks. The becks are converted into sewers, and they convey the sewage of the places into the river. From what I saw, I think the Wear is a very objectionable source of water supply certainly, because there is no doubt that the drainage of a very large population is going into it.

Mr. BIDDER: I suppose if you took these filthy pollutions, mixed them with water, and filtered them sufficiently, you would gradually get rid of the colour if you passed it through successive folds of bibulous paper?

Witness: Filtration has nothing to do with it. You would not get a wholesome water. You would get a good-looking water, but you have all the dissolved impurities in the water. You only improve its mechanical appearance.

Can you give us generally what the principal results of your analyses were of different waters?—Beginning at the Browney, the Browney water is certainly not a pure water by any means. There is a point which I take here, as following Dr. Hill, with reference to the chlorine. There is no doubt in my mind the water contains chlorine, and that is a very good indication of the impurity of the water. The chlorine in the water at the head of the river may be taken at about a grain in the gallon—rather less. It goes on increasing largely as you go down the Wear, and there is no reasonable doubt that it comes from the drainage of the district. The Croxdale sewage, again, contains rather more than 12 grains of chlorine in 100,000 parts, and I have no doubt that that comes from house drainage. In all cases I found considerable quantities of ammonia, both free and albumenoid. I should say that is from the sewage also. The quantity of free ammonia is a remarkable feature of it.

Dr. *Augustus Voelcker*, examined by Mr. BIDDER.

I am a Member of the Royal Society, Vice-President of the Institute of Chemistry of Great Britain and Ireland, and Consulting Chemist to the Royal Agricultural Society. I have had an experience of over 25 years as a consulting and analytical chemist. I visited Durham on the 15th and 16th of this month with the view of inspecting part of the ground through which the River Wear flows above Durham. I had known the river before. I lived in Durham for six months 29 years ago, and I am not quite sure whether I did not make the first analysis for the Water Company when I was assistant to the late Professor Johnston, of Durham. I recollect, in a general way, that it was very much better than it is at present. At the time of my sojourn at Durham it was a decently clear river; but I hardly recognized it the other day when I looked at it at the outfall again. Where the intake of the Water Company is, the condition of the river is very much deteriorated. The water at Houghall is now much discoloured; it is of a greenish colour, and there is an ominous scum on the surface all over it, which I have only seen in foul streams. The river unquestionably at the present time is much polluted, which is readily enough explained by the remarkable increase of the population in the coal-pit district. Even since the last three years the pit population has very much increased. I had occasion to pay a professional visit to North Brancepeth, to give evidence in a pollution case (air pollution, not water pollution), and at that time there were very few cottages there; but I hardly recognized the place when I passed through it the other day, it was so much enlarged, a whole row of cottages has been built in the district. The whole population is very much increased; but there is no provision made for proper drainage. I went up the river, and saw facts which appear to account for the unsatisfactory state of the river. In the whole district there is a regular succession of open sewers, which are discharging their refuse into it. Fortunately, there are gravel-beds lower down, which take some of it out; but, unquestionably, there is a large amount of sewage proper draining into the river. In my judgment, no river water which is polluted with sewage as much as the River Wear is at the present time ought to be used as a town supply, if a better supply can be obtained at a reasonable expenditure. River water, at the best, is a poor water, and not to be compared with spring water, which is always refreshing, and which is clear and unquestionable water. I should not like to depend entirely upon filtration. A great deal may be done with filtration; but the more water is filtered the flatter it gets, and the worse it becomes. People do not like flat water. Then there is always a danger of infection, in certain cases, by pollution.

Mr. *Thomas Spencer*, examined by Mr. VENABLES.

I am an Analytical and Consulting Chemist in London, and have been connected with Water Bills and water inquiries of all sorts for the last 30 years. I was for 15 years professional adviser to the Corporation of Liverpool, and have also been the adviser of the New River, the Chelsea, and the Lambeth Water Companies on matters connected with the quality of the water and sewage. I received for analysis some samples of water sent from Durham, and made analyses of six of the samples. I found it very hard water compared with the Thames water. Nominally it is half as hard again, but practically it is twice as hard, because the hardness of the Wear water is permanent hardness; it does not reduce by boiling. As to the London water, the greater amount of its hardness is made up of chalk, which precipitates on boiling. The London water is of about 12° of hardness, and the other nominally 16°, and when boiled, for practical purposes, the London water becomes 8°. The Wear water does not reduce its hardness at all by boiling. There is a very small proportion of carbonates in it. It has a large quantity of sulphate of lime and magnesia in it. Those salts confer permanent hardness upon the water. I find what I should call an abnormal quantity of common salt. The ordinary quantity of common salt in rivers in rural districts where there is no amount of sewage or house drainage is generally 4 grains to the imperial gallon. The average quantity in the Wear water is 9 grains to the imperial gallon, and, in one instance, I found 20 grains; 4 grains is about the average for fair river water, but had I known nothing of where this water came from, and I found that quantity of salt in it, I should have in the first instance inquired whether it was a tidal river, because in that case we do expect a little more; but, finding that it was not a tidal river, I am compelled to come to the conclusion that it arises from sewage, and the salt itself principally from urine. We always find that so, and even Dr. Frankland, who has been quoted as an authority upon these things, runs to the very utmost with that theory. I should say it is not a theory, for it is really practice; but I mean to say, by quoting him at all as an authority, that I had known before Dr. Frankland was a chemist that it was a truism that

wherever a well was found with a large amount of salt in it that we knew did not belong entirely to the sub-stratification, we were quite certain, and we always found by digging, that a cesspool was in the neighbourhood, and, therefore, that the water had access to a cesspool; and without anything else, I should have come to that conclusion, without knowing where the water had come from, and knowing that it was not a tidal river, and knowing it was not in the salt district in Cheshire, I should have said there was an access of sewage into this water. Having now heard that, as a matter of fact, there is a considerable amount of sewage that does come into it, it is quite what I should have expected. There cannot be any doubt, where you have the fact of sewage discharged into the water, and the other fact, independently ascertained, of a large amount of salt, that the two are connected as cause and effect. That being the case, I certainly do not consider that this is a proper source of supply for a town, if a better one is to be found; but, of course, engineers are greatly bound by the circumstances of the locality round about. If a better source than that—a purer source, pure even from inorganic salt, if it is not too hard for practical purposes—is to be had, I should say that the Company would be consulting their own interest to go to it. A certain amount of hardness, I think, is necessary, for a very soft water is dangerous. It is like a sponge—it takes in every gas, and absorbs every impurity in the shape of hydrocarbon gases that it comes in contact with. But for a practically good supply there is, I believe—and I know most supplies, to the capitals of Europe especially—no better supply than that from the Thames, if properly filtered and treated, now that the sewage has been taken out of it. Therefore, as to hardness, the Thames I consider to be a good useful water for all ordinary purposes; but the Wear water is too hard by about one-half. Previous to the samples being taken, which were forwarded to me, there had been, I should think, what I should call an abnormal fall of rain, which flushed and cleared everything out. But if the samples had been taken immediately after or during the wet weather, I should have found very much more impurity than I did.

Mr. Venables: But that would be the most favourable condition you could have—first, heavy rains to clean the water; and secondly, dry weather when the sample was taken?

Witness: That is the most favourable opportunity that they could have had, because the rainfall just previously was so great that it must have washed and cleansed everything, and then the dry weather rendered it not bad water to look at, and not discoloured at all, nor was it very bad to drink.

Monday, July 22.

Mr. *William Flawith*, keeper of the refreshment-rooms at the North-Eastern Station, Durham, said that the Company's water was laid on there, and was used by his customers. He produced a small trough out of the refreshment-room. It was let in in marble, and just above it was the tap. He usually found it in the condition produced once a week, when the tin was washed out. The water came from a large lead tank. It was not an open one, and no dirt could get into it. It came from the station. The tank was covered over with slates. He cleaned the tank out very seldom; it was the duty of the Company to clean it out. He had complained to the Company of the condition of the water, but not of its quality. The tank was not open to the smoke; it was closed up.

Rev. *Henry Baker Tristram*, examined by Mr. Bidder, said he was one of the Canons Residentiary of Durham, and a Fellow of the Royal Society. He had been acquainted with Durham for more than 40 years, and was one of the members of the Tees Conservancy Board. Since he had known the Wear and its tributaries, he had noticed very great changes in their condition. The streams used to be pellucid and clear when he was a schoolboy, and the only impurities that came in, or the greater part of the impurities that came in, came in below the present intake of the Water Company; but now the colour of the streams was entirely changed, some were of a brown colour, and some of a milky colour, and all had filth in them of different colours. He did not know one that was in the slightest degree pellucid, nor one in which more than an occasional trout was to be found. He attributed this absence of fish simply to the filth that was poured into the water. He could not conceive any person who had seen the Wear—unless he had shares in the Water Company—for a moment supposing that it was fit to drink, if better could be had. He had never drunk it himself, or allowed his family to do so. He had it in his house for other purposes. On the previous Tuesday he saw the carcases of three dogs and one sheep decaying in the water a little above the intake, between Sunderland Bridge and Butterby, and was told that there was a dead horse. He had a good opportunity of ascertaining the opinion of the town, especially of the more educated classes, upon the subject of the water supply, and had never heard but one opinion, excepting from the Shareholders, or those immediately connected with them—viz., that the town was determined not to have the water if they could possibly help it. The feeling of indignation was quite unequalled in the civic annals of Durham. All the medical men he knew, with the exception of Dr. Boyd, were of the same opinion, and, so far as he knew, the magistrates were of the the same opinion. He never knew the town so absolutely unanimous. The opposition to the Bill had sprung from the ratepayers themselves, forcing the Town Council to action, and there was a petition signed by 726 of the leading ratepayers and owners of property. Many people had testified their feeling by subscribing to the cost of the opposition. They were told, in the first instance, that the case was so palpable, and so self-evident, that £200 or £300 would be quite enough; but when told by the Mayor that it would cost £3000, the people said, "We do not care; we will pay anything to have good water, and not to have this forced upon us." It had been suggested that the feeling against the water was a mere artificially got up agitation by somebody instigating and stirring up the people. That was absolutely untrue. It was impossible it could be so, because it was entirely spontaneous from the classes who were the last to raise any agitation, or who could have personal objects to serve. He found that the general rule, even amongst the Shareholders of the Water Company, was to get water from wells for their tea. He had been a sort of ranger of the Dean and Chapter woods, had the care of the wells, and had the opportunity of noticing the number of people who went there. There were three celebrated wells—St. Cuthbert's well, St. Oswald's well, and South Street well—which were on the banks belonging to the Dean and Chapter; those wells were kept clean, and had been tested, and proved to be pure. He counted the other day 14 or 15 people in a row with their tins waiting their turns to get water from that well for drinking purposes. These people had come from the district where the Water Company's pipes and mains were—people who had them in their own houses.

Cross-examined by Mr. Littler: He might have said that the brightest water might contain the deadliest poison. He had never seen germs of disease in water. He did not know there was a house-to-house canvass on the water question, but had heard that there were lectures given on the condition of the water. He had received several analyses of the water from different persons. People outside the city complained of the water.

Mr. *Thomas Binns* said he had taken a strong part against the Bill from conviction, and also from the influence brought to bear on him by the persons he visited as a missionary. When he urged them to become temperate, they stated that they would do so when the water was purer. He had found injurious effects from drinking the water, and had heard many complaints on the subject of the condition of the water.

Cross-examined by Mr. Littler: Drinking the water when he first went to Durham brought on vomiting and sickness. He had never complained to the Water Company, as he was told it was of no use. He had found that people made all sorts of excuses for not signing the pledge. Some of them were founded and others unfounded. Most of those who complained were the most temperate people. It never seemed to strike him to get up an agitation on the subject, for it would be very difficult to get up an agitation against a formidable company.

Mr. *Grant*, constable to the Dean and Chapter of Durham, proved that many of the inhabitants came a good distance in order to get water from South Street well, which constantly flowed. It was accessible to everybody. One day he counted as many as 790 persons who came to the spring with cans, and to get a drink, 40 per cent. of the people coming from the city itself.

Mr. *Stephenson*, a mining engineer, of Hollywell, Durham, said that he had lost one of his family through typhoid fever whilst resident in Durham, and attributed it to the water. The Wear was not a pure river. He measured the flow the previous Tuesday, about ¾ of a mile below Sunderland Bridge, and found it to be 129 million gallons within the four hours, which was an average flow. All the sewage from the collieries ultimately found its way into the Wear. At present there was a great depression of trade, but if there was a revival of trade he supposed there would be a greater quantity of sewage flow in the water.

Mr. *Maynard*, a solicitor in Durham, coroner for one of the Wards of the County, and a member of the Town Council, said he had been concerned in municipal contests in his ward for a good many years, and the question of water had been a question raised in the course of those contests. In canvassing, the people had complained of the water supply, and asked if they could get any better. Some of the complaints were to the effect that if the water was kept in the house all night it smelt the next morning; and others, that the supply was deficient. He had tried a simple experiment with the water, with the view of seeing whether it was wholesome. He had filled a tumbler glass with water from a tap, and placed it on the dining-room sideboard, and allowed it to remain 24 hours; after that he emptied the water out and refilled the glass from the tap, and allowed it to remain other 24 hours. He then tested the inside of the glass with his finger, and got slime off it; and on holding it up to the light, between the glass and the light, the clean sides of the glass could be seen to be contaminated with something. After the failure of the Town Council to petition the House of Commons against the Bill, the reason they did not petition the House of Lords earlier was that he consulted with Mr. Robson as to whether they should take any further action, seeing the position they were in, and they both agreed that, having been once humbugged, they would not take the responsibility upon themselves of starting a petition again; for, he said, depend upon it, if the ratepayers were allowed a little time, they would speak out and tell what should be done; and they did speak out. The voice of the town spoke out so strongly that the Town Council were obliged to take the petition up again. With the exception of Shareholders in the Company, he had not heard one person in Durham approve of the Bill.

Mr. *James Mansergh*, civil engineer, said that he had had large experience in the question of water supply and of sewerage works. Durham proper had a population of 15,000, while the whole of the population of the county was centred near the streams. He had examined the district very carefully, and all the sewerage arrangements in respect to the population. He found that, in all the important towns, the sewage found its way into the River Wear, or into one of its tributaries. He could not agree in the main with the evidence of Mr. Hawksley. In his opinion the water was not wholesome, or satisfactory for a town supply. The population of Durham proper was not increasing; it remained almost stationary. There was no doubt that they did not want a further supply. He did not believe that a single engineer in England would be in favour of the proposed water supply. A strict standard of cleanliness was essential in a water supply. He had little doubt that a proper supply could be obtained for the city, if it was desired. A death-rate was a good test for the water supply of a district, but he did not consider the death-rate of Durham was very low. It was important that the supply should be improved.

Mr. Venables said that was all the evidence he had to offer against the Bill.

Dr. *Tidy* was recalled, at the wish of Mr. Littler, and said that he had examined a sample of the water produced, and found its black appearance was due to coal dust, and that there was an entire absence of sewage in it. Coal dust itself had a remarkably purifying character, but it was certainly not black sewage.

Mr. Venables then addressed the Committee against the Bill. He said that cases of this kind had been brought before Parliament, and it had been his fortune to be engaged on one side or the other for many years, but he might say without hesitation that no case he knew of had been so entirely without grounds on the part of the promoters, or in which they had to contend against such overwhelming evidence. It was true that the Town Council might have petitioned the House of Lords at an earlier period. Several of the members had been called, some on one side and some on the other, and they had fully explained what happened. The gentleman whom he had called that morning said that, after they had "run past the post," most of them held their hands, as they knew that the ratepayers would take the matter up, and they indeed were really the opponents to the measure, they being strong in their opposition, and could be accused of no *laches* in this matter. They were right in waiting to see whether their representatives brought this matter properly before Parliament, and whether, for reasons which had been explained, they failed to perform that duty. It was shown that the ratepayers unanimously came forward, and that they were told in the first instance their opposition to the cause was comparatively small. Then came the question of cost, and it was found that the sum proposed would not be sufficient, when there was an unanimous declaration that whatever its cost they must get rid of the water. In the first place, the onus lay on the promoters of the Bill, who asked for parliamentary powers, to prove their case. Had this been done to the Committee's satisfaction? Mr. Littler, in his opening, had stated that the Company had found it necessary to increase their works, and that they wanted an additional pumping-station, and an additional subsiding-tank. They wanted to acquire land for that purpose, and all these were reasons for raising fresh capital. They had raised their capital without an Act of Parliament, but a remarkable thing was that his learned friend imagined all this; it was not founded on fact. There had been no evidence that they required additional land, and there had been no evidence that they could purchase it by agreement. All these things were taken as granted, but when the evidence came to be given this was not proved, and it was a remarkable thing that there was no increase in the population of Durham, nor had they called one person to prove that they wanted the water. He did not deny that additional works might be required, but there was no evidence to prove that for the town of Durham they wanted to spend sixpence. Being a joint-stock company, they did not want the protection of Parliament. If

Parliament, legislating for the whole country, had known in 1875 that the Durham Company had laid out capital on their works, would it have given them protection? There were a great many cases in which corporations had come to promote Bills, more often to oppose them, for the same purpose of acquiring property. If this Act were passed, Parliament would confirm the proposal that the water of the Wear was a proper supply for the people of Durham, and that the river which received the sewage of Durham, and was polluted in many ways, was a fit source of supply for the inhabitants. If this view were adopted, they would be compelled to filter it and take various precautionary measures. They could not overlook Dr. Frankland's theory, that all such water was dangerous, whatever the chemical analysis might be; and if the Durham Company obtained Parliamentary powers, they would be compelled to supply no other water than that which was obtained from the Wear. Unfortunately, Dr. Frankland had not been called, though an effort had been made to get him, and it was unfortunate that the Committee had not the benefit of his evidence. They had, however, that of Dr. Hill, who belonged to the same school as Dr. Frankland, and what he said Dr. Frankland would have corroborated. The fact was that all the water which had been analyzed by Dr. Tidy proved nothing at all, because, as Canon Tristram said that morning, an analysis made last June did not represent the ordinary state of the water. They did not want an average water, but the worst possible water that could be delivered.

Mr. MICHAEL: The analyses were taken in May, June, and July.

Mr. VENABLES said that he had asked Dr. Tidy, who replied that they were all taken during the period when the water was low, and that was all that was material. Dr. Tidy had said that he could not distinguish between "healthy" sewage and poisonous sewage. With regard to the so-called "sentimental objection," was that lightly to be passed over? Workpeople, to whom time was valuable, it was proved, went half a mile from the town for their water, which they obtained from the wells, and which they knew to be pure, simply because they discovered that the water from the Wear was often objectionable; that at times it smelt strong; but, above all, they objected to it because they knew that sewage had been discharged into it. The people of Durham in this respect were not in any way peculiar; they were only peculiar in so far as this Bill went—they were unanimously opposed to it. Every one almost objected to the Bill except a few Shareholders who were interested in the Company. It was held by certain competent persons in Durham that the water was objectionable, and surely they ought to be considered. The feeling was widespread on the subject of a pure water supply, and in this respect, on the part of the people, there was great sensitiveness. He had called witness after witness to prove that impure matter was found in the water, and this showed that analyses did not exhaust the history of the water. Why should the people of Durham be content for ever to drink this water? Surely, it was a remarkable circumstance that, when the Corporation had allowed the Bill to pass, and that, after it was detained by Lord Redesdale, as soon as it was known there was some chance of opposing the Bill, there was an agitation, with the result that the Committee had become aware of. If the Bill were rejected, things would go on as they had previously been doing. He concluded by urging the Committee to throw out the Bill in the interest of the public.

Mr. LITTLER, on behalf of the promoters, said that his friend had endeavoured to frighten the Committee in regard to this Bill. In the first place, under the Water-Works Clauses Act, the 35th section provided that the promoters or undertakers should provide a supply of pure and wholesome water, sufficient for domestic use, for all the inhabitants, and that the very moment it became impure, and an insufficient source of supply, they could compel this to be done. What the Company wanted was statutory powers. The moment that Parliament authorized water to be taken from a stream, it became the property of the Company only for the purpose of supply, and therefore they would have to protect it. They had arranged with all the millowners, and therefore the Committee had none of these before them. Should they obtain from Parliament what they wanted, they were empowered to take any quantity of water they desired, fully compensating any millowners or others who would suffer thereby. This was one of their obligations. They had no legal rights because they had no legal obligations. If this water was given to them they would have to deal with any pollution, either from a gas company or from any other source, and they did not ask for any increase of rates. They proposed to take the Wear as a source of supply, unless it turned out unwholesome, and if that was established to the satisfaction of the arbitrator who would have to be appointed to inquire into the subject, they would have to get another source of supply. They believed that they had the best source, and for that reason they came before Parliament, but if a better supply could be obtained the Committee might depend upon it that it would be obtained. It had been proved that the death-rate of Durham had been uniformly low, and the place uniformly free from disease, and therefore what had been proved as to the state of the water, the death-rate—an important test—must be taken into consideration. He urged that the case of the promoters had been fully established, that it had been proved by the evidence that he had adduced. Having alluded in detail to the evidence against the Bill, the learned Counsel said Canon Greenwell had stated that the Wear was not so clear as it used to be, but this was denied. He had called gentlemen of the high position of Dr. Tidy, and Professor Odling, and Mr. Crookes, and they were opposed by a theory supported by the evidence which he (Mr. Littler) hardly liked to call by the name. He did not think, under all the circumstances, that the Corporation had proved their case, but that the opposition had failed. It had been proved that the water of the Wear was of an unimpeachable character. There had been no attempt to dispute the colour of the water. They made their comparison of the analyses, and it was in their power to prove, if they could, that the analyses were unduly taken. Some of the samples were taken in May, which was the very time when the water was in full flood, and it was found to be unimpeachable in colour. The water, it had been proved, had never done any harm, and, he ventured to say, if the Committee sanctioned the Bill, never would. He was not going to enter into the question as to the angry feeling that had arisen, and as to the dispute with regard to "running past the post." There was not a tittle of evidence in respect to what had been alleged against the Corporation and against the Mayor.

The CHAIRMAN said that the Committee were of opinion that no evidence on this point had been adduced.

Mr. LITTLER said he was obliged for this intimation in the interests of the Corporation. The Mayor had said that he had never known a matter in which so much ill-feeling had been caused, and he had stated that he had never heard any complaints as to the quality of the water supplied, and he (Mr. Littler) asked if there had been anything wrong in this matter which could induce the Committee to take away from these people, who had supplied the water satisfactorily, who had expended their money, and now asked to expend more money, the supplying of water to the city of Durham. All that it was proposed to do was not objected to outside the city of Durham. Were the Committee going to cut out the city of Durham, when it had been proved that there was plenty of remedy in the hands of the inhabitants for preventing their being supplied should the water be objected to.

Lord TRURO asked under what authority the water was diverted from the Wear?

Mr. LITTLER replied that it was diverted by consent.

The room was then cleared, and after the Committee had deliberated for about half an hour was again opened to the public.

The CHAIRMAN said the Committee had decided that the Bill should not proceed.

Mr. LITTLER said that the North-Eastern Railway Company and others wanted a supply, and he asked what was to be done under the circumstances.

Mr. BALFOUR-BROWNE replied that they could go on in the same way as they had been doing for the last 30 years.

Mr. LITTLER said he presumed that the Committee's decision only affected those parts of the Bill which were opposed—namely, those which at all affected to the city of Durham. The portion of the Bill which was unopposed—namely, that part which proposed to supply a district outside the city of Durham—would, according to the ordinary rule, pass as an unopposed Bill. He proposed, therefore, to strike out all the portion of the Bill relating to the city of Durham, in accordance with the Committee's decision.

The CHAIRMAN: That point ought to have been raised earlier.

Mr. LITTLER: I took it as a matter of course that the Bill would pass.

Mr. BALFOUR-BROWNE: But the Committee have decided that the Bill shall not pass.

The CHAIRMAN: We do not wish to create any confusion.

Mr. LITTLER: It is constantly done, one portion of a Bill being struck out.

Mr. BALFOUR-BROWNE: The Committee have decided that the water is not fit for the supply of Durham.

Mr. LITTLER remarked that if they had proposed to strike out the word "Durham," nobody could have objected.

Mr. BALFOUR-BROWNE urged that such a course would be inconvenient.

Lord TRURO: I understand it is the practice not to give a decision upon a part of a Bill that is before us.

Mr. LITTLER understood that the rule was that the unopposed portion of the Bill went back to Lord Redesdale, which was the general usage.

The CHAIRMAN: If part of the Bill is opposed, it does not go back to Lord Redesdale.

Mr. COATES (the Parliamentary Agent) said the Bill in its present form would only go back to Lord Redesdale on questions of detail.

The room was again cleared, and after the public were re-admitted,

The CHAIRMAN said: The Committee have considered the point, and have decided that the Bill be not proceeded with at all.

Miscellaneous News.

METROPOLIS GAS SUPPLY.

Dr. Whitmore's report on the illuminating power, pressure, and quality of the coal gas consumed in the parish of Marylebone during July, and supplied by The Gaslight and Coke Company.

	Illuminating Power in Sperm Candles.			Mean Pressure in Tenths of an Inch.		Mean Quanty. of Sulphur in 100 Cu. Ft.	Mean Quanty. of Ammon. in 100 Cu. Ft.	Sulphuretted Hydrogn.
	*Mean of 25 Obser.	High-est.	Low-est.	High-est.	Low-est.	Grains.	Grains.	
Gas supplied from the Fulham works .	17·01	17·42	16·60	22·90	9·71	13·8	0·5	No trace
Gas supplied from the Beckton and Bow works . . .	17·04	17·51	16·42	35·40	18·55	10·90	0·4	No trace
Cannel gas supplied from the Pimlico works	21·58	23·90	20·60	28·47	13·60	13·8	0·53	No trace

Mean of daily readings of barometer . . . 29·91
" " " thermometer . . . 74·21

* Each observation consists of ten readings of the photometer, at intervals of one minute.

The mean illuminating power of the three gases consumed in the parish during the month was fully a candle above the legal standard. The Fulham gas on 16 occasions exceeded 17 candles, and was never once below the standard. The gas from Beckton and Bow was 14 times over 17 candles, and was never below the standard. The range of the cannel gas was between 20·60 and 23·90 candles. The mean quantity of sulphur found in 100 cubic feet of the Fulham and Pimlico (cannel) gas was a little over 13 grains; in the Beckton and Bow gas it was less than 11 grains. The pressure of all the gases was satisfactory, and no trace of sulphuretted hydrogen was detected in either of them by the ordinary tests.

METROPOLIS WATER SUPPLY.

Dr. Whitmore's report on the composition of Thames Companies and other waters supplied to Marylebone during July:—

	In Grains, per Gallon.			In Parts, per Million.		In Degrees.	
	Total Solid Matter.	Loss by Incineration.*	Chlorine.	Free Ammonia.	Albuminoid Ammonia.	Hardness.	Hardness after boiling Fifteen Minutes.
West Middlesex	19·20	0·80	1·01	0·00	0·05	13·1	3·0
Grand Junction	19·00	0·80	1·02	0·00	0·07	12·9	3·0

* The loss by incineration represents the amount of organic and other volatile matters contained in the Imperial gallon (70,000 grains) of water. The total solid matter, *minus* such loss, consisted principally of carbonate of lime, with small quantities of other equally harmless salts.

The water of the West Middlesex Company, as drawn from the mains, was uniformly bright and clear; that of the Grand Junction Company contained, on one or two occasions, living and moving organisms. The quantity of organic ammonia found in the water of both Companies was unusually small.

REDUCTIONS IN THE PRICE OF GAS.—At Elland, the price of gas has been reduced from 4s. 2d. to 3s. 9d. per 1000 feet. The Newton (Montgomery) Gas Company have reduced their price from 5s. to 4s. 2d. per 1000 feet. At the last meeting of the Durham Town Council, a letter was read from the Durham Gas Company announcing that, after the 1st of October next, they would reduce the price of gas 3s. per lamp, and 3d. per 1000 feet for that consumed by meter. The Newton Abbot Gas Company have reduced the price from 4s. 7d. to 4s. 2d. per 1000 feet. The Chatteris Gas Company have given notice that the price of gas will be reduced 10d. per 1000 feet from the 6th of July last, making the price 5s.

NORTH BRITISH ASSOCIATION OF GAS MANAGERS.

(*Continued from p. 207.*)

After the reading of Mr. Mitchell's paper on "The Proper Control over Pressure of Gas for Illuminating Purposes,"—

Mr. HISLOP said: I have to propose a vote of thanks to Mr. Mitchell for his paper. There is no new theory advanced in it such as we could debate or discuss; but facts have been laid before us, which, although already well known, cannot be too frequently pressed upon attention.

Mr. PEEBLES: I beg to second the motion. I am exceedingly pleased with the clear statements of Mr. Mitchell, and the beautiful way in which he has illustrated them. We hear a great deal about pressure, but I have never seen results of experiments so methodically put before us as by these diagrams. The subject, so far as the theory of burning gas is concerned, has received ample and clear verification from what Mr. Mitchell has stated.

Mr. M'CRAE: It might be considered more prudent on my part not to say a word, as the paper just read has emanated from Dundee; but with the exception of the diagrams, which I do know—they having been taken for a different purpose—the paper is quite new to me. It has also been interesting, and I am glad of the reception Mr. Mitchell has had for his paper, although it does not contain anything original. He did not profess that it should contain anything of the kind. Mr. Mitchell being one of my own rearing, it is a satisfaction to me that he has made this attempt; and I think if all the Members of the Association would use their influence to get young members to come forward and do what they can, the progress which would be made in matters which to us are of immense importance would be great. I have, however, felt it to be a lamentable fact that, in all my experience of most of the papers read in this and other Associations, we like them, we appreciate them, we criticize them, and we go away home, and we do nothing. We have gentlemen devoting their attention to various pieces of mechanism, and trying to sell them; and others, again, say, "We don't see the use of them; they don't pay;" and they do not devote themselves to such experiments. Had I given in this paper, I could have told you where you could have seen 400 burners with from 2-10ths pressure at the burner. The better that a gas manager can give light to the people, at the lowest cost, the success of the Company or the Corporation would ultimately be the greater. The effect of a decrease in the price of the gas is that the people put on more light; and this is applicable, not only to big works, but to those works to which the President had referred.

Mr. M'GILCHRIST: I express my thanks to Mr. Mitchell for his able paper. There is one thing to which I take exception, and that is getting the maximum amount of illuminating power from a pressure of 3-10ths. I have made experiments, from which I find that the highest illuminating power is developed with 5-10ths of pressure. I should like to know what is the reason of this.

Mr. MITCHELL: I would like to know if Mr. M'Gilchrist has tried the same experiments with a less pressure than 5-10ths, and if his gas smoked.

Mr. M'GILCHRIST: Yes; and I have found that the flame smoked. I also tried it with various burners; but I could not get the highest illuminating power under 5-10ths, and with 5 cubic feet per hour.

Mr. MITCHELL: I quote from Dr. Wallace, that the basis for burning is just verging on the smoking point, and not smoking. Of course we have to be careful that we do not use pressure so low that draught will cause the flame to smoke.

Mr. YOUNG: These remarks as to pressure raise rather a delicate point. The pressure is entirely dependent on the quality. The lower the quality the lower the pressure to make perfect consumption of the gas, and the higher the illuminating power the greater the pressure. If Mr. M'Crae in Dundee has a gas which only requires 3-10ths of pressure to give its greatest amount of illuminating power, and Mr. M'Gilchrist in Dumbarton requires 5-10ths to make perfect combustion of his gas, it shows that the Dumbarton people are getting superior gas to those in Dundee, because the richer the gas the greater amount of pressure for its perfect combustion.

Mr. M'CRAE: I think Mr. Young is quite correct. I would have said if I had taken up Mr. M'Gilchrist's remarks, that his gas was too rich, and, consequently, that he could not get the best photogenic results at 3-10ths pressure. But the matter here has reference to the jets to consumers, and the whole bearing of the paper and diagrams, and the remarks I made, had reference to the results to consumers. If Mr. M'Gilchrist, between this and next year, when we meet in Edinburgh, will test his gas, and give the best photogenic results at his works, and then test the illuminating power as delivered to the consumer, I think we will get more light on the subject.

Mr. M'GILCHRIST: I think that is applicable to the Manager of every town, the Manager of Dundee included.

The PRESIDENT: I have no doubt this paper is of value to us, inasmuch as it deals with facts which have come under Mr. Mitchell's observation. The diagrams especially are of considerable value, showing as they do how the pressure is affected when consumption begins to increase. We are all aware of the fact that it does so, but had we not seen these diagrams we would never have dreamt that it did so to this extent. Therefore Mr. Mitchell well deserves the thanks of this meeting.

Mr. D. BRUCE PEEBLES (Edinburgh) read the following paper

ON GOVERNORS FOR PUBLIC LAMPS AND STAIR-LIGHTS.

If we visit the seat of any of our manufacturing industries, and have the privilege of seeing the machinery employed, and watching the various processes connected with almost any kind of business, we can scarcely fail to note the extraordinary economy which pervades a well-conducted establishment. Indeed, it is now seldom that we see success attend the efforts even of the cleverest, if economy be lost sight of. The truth of the proverb, "A penny saved is a penny gained," is exemplified in every direction in which we turn, and the stimulating effect of honest competition is noticeable as being of all things the best for inducing economical efforts, and leading us to gather up the fragments so that nothing may be lost.

In gas manufacture, economy may be said to present itself in three different forms—first, in getting the greatest yield of gas out of a ton of coal with a minimum of working expenses; secondly, in utilizing all the bye-products, so that as much as possible may be made out of them; and, thirdly, in the using of the manufactured article in the best and most economical manner.

Under the first head may be included the mechanical stoker of Mr. Foulis, the Aitken and Young process, Mr. Hislop's new process for regenerating spent lime, and, generally, every mechanical and chemical improvement tending to cheapen the manufacture.

Under the second head may be classed those scientific discoveries from which spring the application to industrial uses, of the residual products of the distillation of coal, such as naphtha, benzole, sulphate of ammonia, the aniline dyes, &c., and as a notable instance of the rise in value of residual products from these causes, I may, in passing, call your attention to what appeared only lately in the pages of the JOURNAL OF GAS LIGHTING, in reference to Bradford. Between seven and eight years ago the old Bradford Gas Company agreed, by contract, to sell the whole of their ammoniacal liquor for £800 a year. A short time ago the contract expired, and instead of £800 the Corporation were offered £10,600 a year for it.

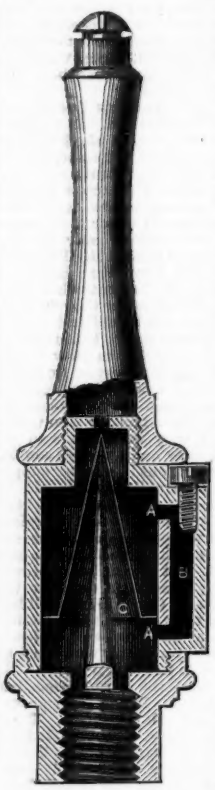
Under the third head we may class improvements in the distributory apparatus, such as gasholders, valves, pipes, fittings of all kinds, governors, burners, reflectors, and every appliance by which the gas may be distributed and consumed with the greatest economy. In connection with this part of the subject, the general public are equally interested with the gas engineer, because, not only economy, but health has to be considered, as we all know that gas which is not properly consumed is not only wasted, but vitiates the atmosphere, and renders our dwellings unhealthy.

Gas managers are now looking into this branch of the subject much more than they used to do, and the popular lectures which are frequently given by them show that they are really anxious to let the public know the best methods of consuming gas, that it is not pleasant for them to make a good article and see it wasted, even though they be paid for it, and that gas economy should not be considered by them only within the gates of the gas-works, but should have their attention from retort to burner. It will be a good thing for the public when the supervision of the gas manager is extended to the internal fittings, on to, and including, the burner. That this will come, I have no doubt, and then the "gas-burner man," whom we all know so well, will vanish from the scene, and bad fittings and jumping lights will no more be known.

It cannot be doubted that there is an enormous annual waste from leakage, bad burners, and excessive pressure, and it is to this part of the subject of gas economy—viz., the controlling of pressure—that I have been applying myself for a number of years past.

From the circumstance that I have long been largely engaged in the manufacture of gas-governors, including those for public lamps, in which, of course, the governor is required for controlling the consumption of gas at a single burner only, I often have been asked by friends if I could not make some reliable and yet simple lamp governor, in the construction and use of which leather and liquid could be dispensed with; and, after many experiments, I believe I have succeeded in doing so. To-day I have the privilege of showing you the results of my labours in that direction, and you will observe from the drawing that the lamp governor I now bring before you is of the simplest construction.

It consists of a hollow flanged cone, resting on a needle-pointed stud, and working in a cylinder to which the flange of the cone is accurately fitted. The needle point is set exactly under the valve-seat, and keeps the apex of the cone always in position, so that the valve cannot, by any means, get out of its proper place; while, at the same time, the greatest freedom of action is allowed to the cone. The simplicity of the apparatus is such that there seems to be scarcely a possibility of it getting out of order, and the only bad thing about it, from a manufacturer's point of view, is, that it will last for ever. You will observe from the drawing that there are two lateral openings, A A, in the case, one below and another above the flange of the cone. These are connected by a vertical passage, B, and it is through this passage that the gas is supplied to the burner when a varying consumption is required, either for lamps, or for stoves, or gas fires—the apparatus is made larger when applied to the latter. A small conical-pointed screw is used to open or close the top lateral passage, the use of this screw being to vary or adjust the quantity of gas delivered at the burner. By simply turning the screw, any modification in the size of the flame or flow of gas can be readily obtained. When the size of flame and flow of gas are required to be constant, as in public lamps, the best and simplest arrangement is to dispense with these passages, and pierce a small hole, C, in the hollow cone. The size of the hole regulates the flow of gas, which, once being adjusted, a constant and unvarying discharge may be depended on.



The action of the instrument is as follows:—As soon as the stopcock is opened, the gas fills the interior of the cone, and momentarily closes the valve; but, finding its way by the vertical passage, or through the hole, C, in the cone, it reaches the chamber above the cone. The cone is, therefore, now surrounded by gas at the same pressure, and, having nothing to support it, falls, and lets gas pass to the burner. But this only takes place to an extent that allows a differential pressure to be established, sufficient to support the cone, which is then equilibriated between two pressures, and the difference between these two pressures remains constant, however much the initial pressure of the gas may vary, unless, of course, it gets so low as not to be able to raise the cone. It follows, therefore, that a constant flow of gas will be maintained under varying pressures, and, although larger burners be used, no more gas will be allowed to pass than what the governor has been adjusted to deliver. Whenever the initial pressure of the gas is increased, there will be a greater difference of pressure between the gas below the cone and that above it, and the cone will at once rise until the equilibrium is again established. Should the initial pressure be decreased, there will be less pressure below the cone, which will at once fall, and again restore the equilibrium, so that the valve is opened by a decrease and closed by an increase of the initial pressure, by this action establishing a constant flow of gas under every change of the initial pressure, and that notwithstanding the size of the burner be changed. It must be understood that when a larger burner is employed, the pressure at the point of ignition is diminished, and *vice versâ*, so that to get the best results a burner of a size suitable to give the desired pressure should be used, or the regulating screw or hole adjusted to suit any particular burner which may be wished. But with burners obtained from any good maker there will be no perceptible difference of the size of the flame, and no difference at all in the consumption, although the burners be changed, if the same number of burner be put in, which is not the case when the ordinary leather diaphragm governor is used. It is this peculiarity which forms the characteristic difference between this class of governor and the well-known flexible diaphragm governor, which I have so long manufactured. With the leather diaphragm governor, a constant pressure is maintained, with a varying volume or discharge if the size of the burner be changed. With this new governor a constant

volume or discharge is maintained, with a varying pressure if the size of the burner be changed. This makes it especially valuable to gas companies who supply gas to public lamps and stair-lights by contract, at a fixed charge. Both are liable to be tampered with, either by putting on larger burners, or by widening the holes of burners which may be so securely fixed that they cannot be taken out readily. I may here explain in regard to stair-lights, that our English friends will scarcely appreciate the meaning of such a term, and in case the remarks now made may not be understood by those south of the Tweed, I may simply state what you all so well know—that "stair-lights" are peculiar to the Scotch system of building dwelling-houses in flats, which is now being introduced into some districts of London, and the "stair-lights" are for the general benefit of the in-dwellers of each tenement, the gas used being paid for by them collectively. No meter being used, there is every inducement to burn the gas longer than the hours stipulated for in the contract with the gas company, and also to put on larger burners than those upon which the contract for lighting is based.

It now remains for me to put the governor in action, and show you that it does all I have said it can do; and by contrasting it with one of my ordinary lamp governors, you will be able at once to see the difference of their behaviour, when tried under the same conditions.

You will notice that when I subject the ordinary governor to different initial pressures, the flame keeps steady and without variation. The gas is consumed at a certain pressure, which does not vary, whatever variations of pressure may take place in the main supply-pipe; but, if I take out the burner, and put in one of a larger size, we at once get a much larger flame, but still burning at the same pressure as before.

If I now take one of the new governors, and subject it to the same test, we observe that the flame remains constant, with every variation of the initial pressure, the same as with the ordinary governor; but, if I put in a larger burner, we do not get a larger flame, as in the former case, but we get exactly the same volume of gas issuing at a lower pressure.

There is nothing new in the principle of this instrument. It was discovered long ago by Leslie, and, independently, I believe, afterwards by Giroud. Since then there have been many varieties of this kind of governor manufactured, but none has been so successful as Giroud's Glycerine Rheometer, which most of you have, no doubt, seen and tested.

It would have afforded me much pleasure to have given an account of a few of the best of these inventions, and to have explained them by the help of drawings; but, as I had no intention of being here to-day as a speaker, until I lately heard from our respected Secretary that he was much in want of papers, so little time was left at my disposal that I had to abandon the idea.

I hope, however, at some future time to go more fully into the subject, and to show also some further improvements in station and district governors.

Mr. Hislop: We are frequently startled at the announcement of inventions which promise to revolutionize the whole system of artificial illumination, but we fail to realize them; we have merely the announcement that some great thing has been discovered. Here, however, we have an instrument for the regulation of gas pressure, which, I am bound to say, will revolutionize our system of public lighting. This instrument I have carefully submitted to the most severe tests that I could conceive, both as to the quantity of gas and pressure, and I could find no appreciable variation. Engineers have long expressed the desire to have an instrument that would give the same quantity of gas with different sizes of burners. To attain this has hitherto been the great difficulty. My experience of Mr. Peebles's governors has been that, while they are sent out at the beginning of the year all properly adjusted, accidents happen to the burners; the lamplighter takes them out, and for them substitutes others, and we generally find that those which have been substituted are not in favour of corporations; then, besides, the oil from the diaphragm gets down upon the valve, interferes with its action, and the mechanism thus becomes choked. This new governor seems to meet all requirements for public lighting. No longer will the surreptitious user of gas be enabled to get an increased quantity for the money he is paying; and if he substitutes a larger burner than that provided, he will perhaps have a slightly diminished quantity instead of the quantity he might expect. In this instrument we see the work of a philosophic mind and true mechanician. The instrument is unique in itself, of very small bulk, and altogether beautiful. It will, I have no doubt, meet all the requirements of those who use gaslight, and it will obviate the use of meters in the future. The instrument is "a thing of beauty," and I believe that it will be "a joy for ever."

Mr. M'Gilchrist: The paper which we have just listened to by Mr. Peebles is, like all his former productions, very concise, and characterized by great ability. I may state that Mr. Peebles sent me one of his governors some time ago, with a view to testing its qualities, and giving the results of these tests to this meeting. I had the pleasure of a visit from Mr. Young, of Clippens, and Mr. Smith, of Helensburgh. We all tested the governor, and on comparing notes we found that the instrument performed its work in substantially the following manner:—

With the Burner.

With a pressure of	10-10ths,	consumption at the rate of			2·76	feet per hour.
"	"	20-10ths,	"	"	2·70	"
"	"	30-10ths,	"	"	2·70	"
"	"	40-10ths,	"	"	2·70	"

Without the Burner.

With a pressure of	10-10ths,	consumption at the rate of			2·73	feet per hour.
"	"	40-10ths,	"	"	2·55	"

You will observe that, without the burner, at 4 inches of pressure there was really less consumption than when burning under a pressure of 10-10ths with the burner. That clearly proves that the instrument is capable of doing its work well. And it is constructed of one of the most durable materials that we have, and will last for a very long time. Ultimately, I believe, it will take the place of the average meter system. This is a flow-regulator, which is said to consume a certain quantity of gas per hour, with a certain standard illuminating power. If the gas company reduces the illuminating power, a greater quantity of gas will be consumed, and *vice versâ*, if the company manufacture gas with a higher illuminating power than that at which the standard of the average governor is set, they will get the benefit in having a decreased consumption in consequence of the increase in the illuminating power. I have no doubt Mr. Peebles's governor will become very famous, and will supersede other governors in which leather is used.

Mr. M'Crae: I would not be doing justice to Mr. Peebles if I did not say a word. I have devoted many years to regulators, and lamp regulators especially, and with some degree of success, and I may say if I had had the one which I now see before me, I never would have had a leather one. That is putting it shortly. I have never, in all my experience, seen anything approaching this instrument so suited to the purpose for which it has been made. I have never seen the instrument till to-day, and I have never had the pleasure of testing it; but it is bound to give results similar to those which we have seen and heard read. And supposing I had not seen or heard anything else to-day, I should have felt my visit to St. Andrew's largely rewarded in witnessing the experiments with this pretty little instrument, and in listening to a paper so full of instruction. I have great pleasure in expressing my approval of the instrument; and I trust Mr. Peebles will be largely rewarded for the great thought, consideration, and expense which must have been the cost of bringing out such a perfect little instrument.

Mr. Young: I have scarcely anything to add, with this exception—that Mr. M'Gilchrist gave the whole three of us the credit of being at the testing at the one time. Such was not the case, because I made the experiments, so far as I was concerned, personally, and some days before Mr. M'Gilchrist and Mr. Smith. It was some days afterwards that we compared results, and I was very pleased to find they were substantially identical. I submitted the instrument to the most severe tests, and, do my best, could not get it to vary, either with or without the burner. I may remark that I am thoroughly convinced that the principle on which this instrument is constructed is the most perfect principle possible. Nine or ten months ago I had a conversation with Mr. M'Gilchrist, and a similar idea was then suggested to us, the only difference being that, instead of having a little cone with an orifice at the cap, I proposed to use a flat disc with a hole in the orifice, working in a cylinder. I think there is not the least doubt that this will supersede all modes of regulating the quantity to be consumed by street-lamps and stair-lights. The instrument has, further, this advantage, that it is not only a mere governor with a given sized burner, but a flow-regulator, which prevents any variation in the consumption, whether you use a larger or smaller burner. The apparatus is so essentially correct in its mechanical details that I believe it will be reduced to even less space than that which it now occupies. If the flow-measurer could be reduced in size by constructing it in the form of a burner with a moveable disc, such as I have just indicated, I have not the least doubt that it would be very extensively employed, and with very great advantage, by parties having various flats.

Mr. Macpherson: I feel greatly indebted to Mr. Peebles for his ingenious little instrument, and I have no doubt it will be found to be of great advantage to gas companies generally. We are considerably indebted to Mr. Peebles for many improvements, and perhaps he might add to our obligations by favouring us with a little instrument that will record the number of hours that a lamp burns—that would start when the gas was turned on, and stop when it was turned off, and then we would have the exact volume and the exact number of hours, and thus we could arrive at a perfect calculation of the quantity of gas consumed in public lighting.

The President: I may say that Mr. Peebles sent me the other day one of his little instruments. I had not time to put it to the test, so as to bring results to this meeting, but I did try it, and from the reports by other gentlemen, I think we may take it as a settled fact, that this instrument is one which will fulfil the duty required of it—namely, to give a constant quantity of gas with an inconstant pressure.

Mr. Watson: How does the cost of it compare with the old regulator?

Mr. Peebles: Well, I want to manufacture them as cheaply as the others, if I can. I am exceedingly obliged to you all for your kindly expressions of approval of this little governor. It has cost me a good deal of thought, time, and labour; but the expressions of approval from so many of you are quite a sufficient reward for anything I have done. With regard to the remark by Mr. Macpherson, I may state that what he suggested is a thing which I expected to have been able to have shown you to-day, attached to the governor; but which, owing to pressure of time, I was unable to complete. On some future occasion I trust to be able to submit a governor with a timepiece attached, and to give a full description of it.

On the motion of Mr. James Whimster, a cordial vote of thanks was given to Mr. Peebles.

(To be continued.)

ELLAND-CUM-GREETLAND GAS COMPANY.

The Half-Yearly General Meeting of this Company was held on Monday, the 5th inst.—Mr. Richard Walker, Chairman of the Board of Directors, presiding.

The Secretary (Mr. W. A. Walker) read the notice convening the meeting, and it was resolved that the following report be received, adopted, and entered on the minutes:—

The rental for the past half year is £2947 4s. 9d., as against £2827 14s. 5d. for the corresponding period last year, being an increase of £119 10s. 4d. In the production of this revenue, the Directors have paid on coal account alone £225 7s. 2d. less than in the last corresponding half year; the Shareholders will agree with the Directors that this result is satisfactory.

The saving in this department is due in a great measure to active steps taken some months ago to reduce the quantity of gas unaccounted for, and the Directors hope to continue these steps still further, with the same favourable result.

The accounts show a profit of £1391 13s. 9d., which together with £2177 6s. 11d., the unappropriated amount brought forward from the preceding half year, makes the balance available for dividend £3569 0s. 8d. Out of this sum the Directors recommend the declaration of the usual dividend at the rate of 10 per cent. per annum, free of income-tax, on the original and ordinary stock of the Company.

The works have been maintained in an efficient condition, and during the half year two new scrubbers of great capacity have been erected, in order to secure the advantages to be derived from successfully washing the gas. The high price which can now be obtained for ammoniacal liquor renders it desirable to produce the maximum quantity of this excellent marketable commodity.

One of the gasholders has also been re-roofed, two of the purifiers have received considerable repairs, four old beds of retorts have been renewed, and one new bed added; from all these alterations the Directors hope to secure the best possible results.

During the half year the Directors have, with the previous sanction of the Shareholders, promoted in Parliament, and have been successful in obtaining, a Provisional Order conferring power on the Company to raise by share and loan capital a further sum of £33,777.

The standard price to be charged for gas has been fixed by the Order at 4s. per 1000 cubic feet.

The Directors have pleasure in announcing a reduction in the price of gas from 4s. 2d. to 3s. 9d. per 1000 cubic feet, to take effect from the 1st of July last. They have confidence, in the event of a revival of the trade of the country, that the revenue will not suffer to any material extent from the reduction.

The two retiring Directors and the Auditors were re-elected, and a vote of thanks to the Chairman concluded the proceedings.

MELBOURNE (AUSTRALIA) METROPOLITAN GAS COMPANY.

An Extraordinary General Meeting of this Company was held on Friday, June 7—Mr. Benn in the chair—for the purpose of obtaining the sanction of the Shareholders to the borrowing of the sum of £100,000 for the further extension of the works.

The Chairman explained that it had been found that the issue of debentures sanctioned by the meeting held on the 24th of April would not, to any needful extent, meet the requirements of the Company, and it had become necessary to make other financial arrangements, more particularly as complaints concerning the supply of gas had become very prevalent. However willing the Directors might be to remedy the defects complained of, this could not be done without very considerable expenditure. No reasonable effort would be left untried to improve the present condition of matters with respect to the supply, but both time and money would be

required. It was now proposed to borrow on debentures the sum of £100,000 for the further extension of the works, and he was glad to mention that the whole amount had been taken up by the National Bank, at ¼ per cent. premium.

Mr. HAM proposed, and Mr. TWENTYMAN seconded, the following resolution, which was agreed to:—"That the sanction of this meeting be and the same is hereby given to the borrowing by the Company of the further sum of £100,000, for the purposes of the undertaking as defined by the Company's Act of Incorporation, by the issue of debentures secured upon the undertaking, rates, and other revenues of the Company."

Mr. HART proposed, and Mr. CROPPER seconded, the next resolution, which was also agreed to—"That so much of the resolution passed at the extraordinary general meeting of the Company, held on the 24th day of April last, authorizing the borrowing of £100,000, as provides that the debentures to be issued in respect thereof shall be payable in Melbourne on the 1st day of April, 1885, and bear interest in the meantime at the rate of £6 per centum per annum, is hereby varied, and it is hereby resolved that the principal and interest secured by such of the said debentures as have not been already issued, as well as the principal and interest secured by the debentures to be issued in respect of the money authorized to be borrowed at this present meeting, may be made payable, in accordance with the provisions contained in section 58 of the Company's Act of Incorporation, at such time or times, and bearing interest in the meantime at such rate or rates, payable half yearly, as the Directors may think fit."

The CHAIRMAN explained that debentures would be issued payable in London or Melbourne at the option of the purchaser, and also debentures payable in Melbourne only, the former, of course, at an increased price.

The meeting then closed.

CAMBRIDGE UNIVERSITY AND TOWN WATER-WORKS COMPANY.

The Ordinary Half-Yearly Meeting of this Company was held last Friday—the Rev. Dr. OKES, Provost of King's College, in the chair.

The Directors, in their report, recommended that a dividend on the consolidated stock, and upon the first call on the new shares for the half year and on the second call upon the new shares for the quarter ending July 6, 1878, at the rate of 10 per cent. per annum, be paid on the 1st of September next, free of income-tax. To assist in the payment of this dividend, the sum of £65 2s. 4d. would be appropriated from the suspense account. They referred the Shareholders to the Engineer and Manager's report, which showed the progress of the Company's business and the extension of the works. The reduction in the consumption of fuel referred to therein had been effected notwithstanding the increase in the water rental. The completion of the new works at Cherryhinton, and of the duplicate main from thence to the town, placed the Company in a most satisfactory position for supplying water to the large and increasing population within their area of supply. The Directors felt that it must be gratifying to the shareholders to find that the revenue had kept pace with the large outlay which it had been necessary to incur in order to effect the improvement in the means of supply.

The Engineer and Manager (Mr. H. Tomlison) reported that during the past half year water from the Company's works had been laid on to 116 premises, the increased rental derivable from which was £129 per annum. The total number of premises now supplied was 7027. The new works at the Company's pumping-station had been completed in a satisfactory manner by Messrs. Bell and Sons, the Contractors for the new buildings, and by Mr. J. I. Headly, the Contractor for the new engine and boiler. These had been at work during nearly the whole of the past half year, and great economy had resulted from their use. The consumption of fuel in the last six months was 82 tons less than in the corresponding part of 1877. The duplicate main from the works at Cherryhinton had been completed during the half year just concluded, as well as various extensions of the distributing mains for the supply of additional parts of the town and neighbourhood.

The CHAIRMAN proposed that the reports of the Directors and the Engineer and Manager be received, adopted, and entered on the minutes. He said he was sure, that at that period of the year and state of the atmosphere, the Shareholders would not expect a lengthy speech from him, especially as the material he should use was incorporated in the reports. He expressed a hope that the Company would continue to pay 10 per cent. dividend, as the whole of the new works had now been completed according to the original intention of their first surveyor. He hoped they would derive a source of income which would remunerate the Shareholders for their venture.

Mr. BALLS seconded the motion, which was agreed to.

The CHAIRMAN proposed a dividend in accordance with the Directors recommendation.

Mr. E. SMITH seconded the motion, which was carried unanimously.

Dr. E. H. PERCWNE proposed, and Alderman DEATH seconded, a vote of thanks to the Chairman for his able conduct in the chair.

The CHAIRMAN having acknowledged the compliment, the proceedings closed.

WARRINGTON CORPORATION GAS-WORKS.

We have been favoured by Mr. Paterson with the following copy of Statements of Accounts of the Warrington Gas-Works, for the two half years ending respectively Dec. 31, 1877, and June 30, 1878, extracted from the gas-works books of account by Mr. Lewis Voisey, the Public Accountant of the Borough:—

Account No. 1 is a balance statement of the late Gas Company's accounts as on June 30, 1877, the date the Warrington Corporation are considered to have taken possession.

Account No. 2 is the revenue account of the gas-works for the half year ending Dec. 31, 1877.

Account No. 3 is a balance statement of the gas accounts for the half year ending Dec. 31, 1877.

Account No. 4 is the revenue in respect of the half year ending June 30, 1878. In the previous half year—viz., to Dec. 31, 1877—there is an item of £107 10s. charged for interest on the bondholders debt, but in the June half year there is only a sum of £8 15s. charged under that head, it having been left to the Borough Treasurer to pay the remainder of the interest on that debt out of the moneys the Gas Committee have paid him. It is also to be remarked that the rates and taxes charged in the June half year are larger in amount than they are charged in the previous or December half year, the reason for which is that a whole year's income-tax and an increased poor-rate have been charged in the accounts for the half year ending June, 1878.

Account No. 5 is a balance statement of the gas-works account for the half year ending June 30, 1878.

Account No. 6 is intended to give a concise but complete statement (exclusive of charges incidental to the purchase and of the capital values of the works and annuities, £2700 bonus to shareholders, and £210 gas consumers deposits) of the position of the Corporation with the gas-works down to June 30, 1878. It shows (subject as stated) what was the ultimate amount of surplus assets the Corporation received from the Gas Company, and the net revenue which has been made for the year ending June 30, 1878; also what moneys have been expended on capital account under the management of the Corporation, what moneys have been paid to the Borough Treasurer, and what balance there is remaining to the credit of the Corporation.

The result of the year ending June 30, 1878, in a "profit and loss" sense, is as under:—

Balance of profit, Dec. 31, 1877		£4618	9 6½
Ditto, June 30, 1878		4433	1 10½
		£9051	11 5
Add charged in those two half years as interest paid to bondholders, viz.—			
December, 1877	£107 10 0		
June, 1878	8 15 0		
		116	5 0
		£9167	16 5
Deduct bondholders annual interest and the whole year's annuities—viz., interest to bondholders on £5350	£217 10 0		
Annuities, viz.—			
£2 per share on 1800 shares (£20 paid)	£3600 0 0		
14s. per share on 3600 shares (£8 paid)	2520 0 0		
	6120 0 0		
		6337	10 0
Net profit in favour of the Corporation on the year		£2830	6 5

No. 1.—BALANCE STATEMENT *on June 30, 1877, when the Warrington Corporation took Possession.*

To Shareholders capital		£64,800	0 0	By Capital expenditure	£59,428 4 1
Reserve-fund		3,497	15 5	Balance carried down	14,440 3 9
Balance revenue account, June 30, 1877		5,570	12 5		
		£73,868	7 10		£73,868 7 10
Balance in favour of the Corporation		£14,440	3 9	Stock	£1,887 4 1
Bond debt		5,350	0 0	Balance at bankers	4,268 0 8
Sundry tradesmen and creditors		344	8 3	Due for gas accounts and meter rentals	10,186 12 1½
Discounts in suspense against accounts owing *contra*		1,301	14 6	Ditto fittings	463 18 6½
				Ditto coke	390 17 1
				Ditto tar	659 8 5
				Ditto ammonia	72 10 9
				Ditto lime	31 13 2
				Miscellaneous sales owing	52 15 9
				Cost of £3593 5s. 9d., Consolidated Three per Cent. Annuities	3,391 6 5
				Cash balance	31 19 6
		£21,436	6 6		£21,436 6 6

No. 2.—REVENUE ACCOUNT, *for the Half Year ending Dec. 31, 1877.*

To Stock on hand, June 30, 1877			£1,887 4 1	By Gas sales and meter rentals	£11,574 12 2½
Sundries, viz.—				Fittings sold	736 17 7
Wages for gas manufacture	£973 12 7			Coke sold	666 7 2
Repairs, bricklaying, &c.	66 12 8			Tar sold	733 4 9
Ditto ironwork	283 16 11			Ammonia sold	303 6 10
Cannel and coal	4,270 13 3			Lime sold	46 9 10
Lime	414 15 9			Sundries sold	42 3 10
Water	76 13 5			Bank interest	51 0 3
Retorts and fire-bricks	246 2 8			Capital expenditure (see item *contra*)	3,012 4 4
Meter inspection and repairs	151 16 10			Stock on hand, Dec. 31, 1877	2,311 9 6
Lamp repairs	30 12 4			Cottage rents	153 11 2
Lamp lighting	209 4 4				
Salaries	474 8 0				
Rates and taxes	490 12 0				
Office expenses	168 9 5				
Fittings	620 3 6				
Repairs to cottages	4 6 6				
Rates on cottages	17 4 4				
Law charges	4 7 0				
General expenditure	103 13 4				
Capital purchases (see item *contra*)	3012 4 4				
Interest on loans	107 10 0				
Paid bank commission	12 3 10				
			11,739 3 0		
Discounts (estimated)			1,386 10 10		
Balance, profit			4,618 9 6½		
			£19,631 7 5½		£19,631 7 5½

No. 3.—BALANCE STATEMENT, *for the Half Year ending Dec.* 31, 1877.

To Due to Corporation, as per Appendix A annexed			£8,773	11	9½
Bond debt			5,350	0	0
Sundry creditors			1,562	11	11
Discounts in suspense against gas accounts			1,443	13	7½
			£17,129	17	4

By Accounts due for gas and meter rentals			£11,002	13	11½
Ditto	fittings		705	5	0
Ditto	coke		327	17	4
Ditto	tar		499	4	5
Ditto	ammonia		131	14	10
Ditto	lime		31	16	10
Ditto	miscellaneous sales		36	19	6
Stock on hand, Dec. 31, 1877			2,311	9	6
Cash balance		£20 2 2½			
In bank		2062 13 9			
			2,082	15	11½
			£17,129	17	4

Appendix A *to* BALANCE STATEMENT, *for the Half Year ending Dec.* 31, 1877.

The Warrington Corporation in Account with the Warrington Gas-Works.

To Dividend due June 30, 1877, and paid			£2,772	18	0
Balance down			11,680	5	2
			£14,453	3	2
Paid Mr. Jeans, Law Clerk	£31	10 0			
Paid Messrs. Jeans and Co., law charges	196	14 9			
Paid Directors	32	0 10			
Capital expenditure in mains, &c., &c., since June, 1877	3012	4 4			
	£3272	9 11			
Deduct received per Woolton Gas Company for old purifiers	£150	0 0			
And from War Office for new main to barracks	200	0 0			
	350	0 0			
			£2,922	9	11
To Cash paid Borough Treasurer, October, 1877			4,678	4	8
Balance carried forward			4,079	10	7
			£11,680	5	2

By Balance, as per balance statement for half year ending June 30, 1877			£14,440	3	9
Profit on realizing £3593 5s. 9d., Consolidated Three per Cent. Annuities			12	19	5
			£14,453	3	2
Balance brought down			£11,680	5	2

By Balance brought forward			£4,079	10	7
Balance of trade profit for half year ending Dec. 31, 1877	£4619	9 6½			
Bank interest on old bank account at date of June 30, 1877	£26	11 7			
Less bank commission	4	4 5			
	£22	7 2			
Less dividend on £3593 5s. 9d., Three per Cent. Consols for July, 1877	53	4 6			
	75	11 8			
			4,694	1	2½
			£8,773	11	9½

No. 4.—REVENUE ACCOUNT, *for the Half Year ending June* 30, 1878.

To Stock on hand, Dec. 31, 1877			£2,311	9	6
Sundries, viz.—					
Wages for gas manufacture	£996	14 10			
Repairs, brickwork	60	13 6			
Ditto ironwork	268	3 2			
Cannel and coal	3871	6 9			
Purifying material	201	4 3			
Water	76	18 5			
Retorts and fire-bricks	240	17 9			
Meter inspection and repairs	160	15 2			
Lamps and repairs	46	10 2			
Lamplighting	229	5 10			
Salaries	489	8 6			
Rates and taxes	657	6 0			
Office expenses	45	7 0			
Fittings	529	0 9			
Repairs to cottages	30	1 8			
Rates on cottages	17	19 10			
Law expenses	4	11 0			
General expenses	136	3 9			
Stock purchases (see item *contra*)	1542	15 10			
Interest on loans	8	15 0			
			9,613	19	2
Discounts (estimated)			1,332	7	6
Bank commission			12	17	10
Balance, profit			4,433	1	10½
			£17,703	15	10½

By Gas sales and meter rentals			£11,230	11	0½
Fittings sold			540	8	1
Coke sold			698	14	6
Tar sold			1,004	14	5
Ammonia sold			377	5	9
Lime sold			22	13	6½
Sundries sold			121	3	3
Capital expenditure (see item *contra*)			1,542	15	10
Cottage rents			143	7	5
Balance of discounts, &c., reserved, to December, 1877			62	14	10½
Stock in hand, June 30, 1878			1,959	6	11
			£17,703	15	10½

No. 5.—BALANCE STATEMENT, *for the Half Year ending June* 30, 1878.

To Due to Corporation, Dec. 31, 1877, as per sheet, *ante*, No. 3		£8773	11	9½	
Balance of revenue account for half year ending June 30, 1878		4,433	1	10½	
		£13,206	13	8	
Deduct capital expenditure for half year ending June 30, 1878	£1542 15 10				
Cash at sundry times to the Borough Treasurer during the half year ending June 30, 1878	7338 0 5				
		8,880	16	3	
		£4,325	17	5	
Note.—For a recapitulation of the accounts showing this balance, see Appendix B.					
To Bondholders		5,350	0	0	
Sundry persons, creditors		588	14	4	
Discounts in suspense against gas accounts		1,332	7	6	
Due to bankers		2,295	6	8	
		£13,892	5	11	

By Accounts due for gas and meter rentals			£10,422	7	2
Ditto	fittings		577	2	8
Ditto	coke		347	0	6
Ditto	tar		383	0	8
Ditto	ammonia		63	3	0
Ditto	lime		12	19	3
Ditto	miscellaneous sales		102	9	5
Stock on hand, June 30, 1878			1,959	6	11
Cash in hand			24	16	4
			£13,892	5	11

Appendix B *to* BALANCE STATEMENT, *for the Half Year ending June* 30, 1878.

Statement of Surplus Assets received by the Corporation from the Gas Company.

To Dividend due, June 30, 1877			£2,772	18	0
Liabilities of Gas Company discharged since June, 1877, viz.— Law charges, Law Clerk's salary, and Directors fees, as per Appendix A.			260	5	7
Balance down			11,495	11	3
			£14,528	14	10

By Amount in favour of Corporation, as per Appendix A		£14,453	3	2	
Other items, also as in Appendix A		75	11	8	
			£14,528	14	10
		£14,528	14	10	
Balance, being surplus assets handed over to the Corporation		£11,495	11	3	

Payments and Receipts on Capital Account since the Corporation have been in Possession of the Works.

To Capital expenditure during half year ending Dec. 31, 1877			£3012	4	4
Deduct received from Woolton Gas Company for old purifiers	£150	0	0		
And from War Office for new main to barracks	200	0	0		
	350	0	0		
			£2,662	4	4
To Capital expenditure during half year ending June 30, 1878			1,542	15	10
			£4,205	0	2

Statement of Profits realized since the Corporation have been in Possession.

By Realized profit for half year ending Dec. 31, 1877, as per account No. 2	£4,618	9	6½
Realized profit for half year ending June 30, 1878, as per account No. 4	4,433	1	10½
	£9,051	11	5

Summary of the Statements in APPENDIX B.

To Capital expended, as above			£4,205	0	2
Cash paid the Borough Treasurer, as under :—					
Oct. 29, 1877	£4678	4	8		
Jan. 14, 1878	3060	0	0		
Jan. 28, 1878	1088	8	8		
June 24, 1878	3189	11	9		
			12,016	5	1
Balance in favour of the Corporation on June 30, 1878, as per balance statement, account No. 5			4,325	17	5
			£20,547	2	8

By Surplus assets in favour of the Corporation, as above	£11,495	11	3
A year's profit, as above	9,051	11	5
	£20,547	2	8

BIRMINGHAM CORPORATION WATER SUPPLY.

At the Meeting of the Birmingham Town Council last Tuesday—the MAYOR (Mr. Kenrick) presiding—the Water Committee presented a report, which, among other things, stated that they had granted a further extension of time to the Aston Local Board to carry out their works for the preventing of the pollution of the River Tame. They had caused proceedings to be taken in the County Court, under the Rivers Pollution Act, 1876, against the Sanitary Committee of the Aston Union, for polluting Plant's Brook at Sutton. An undertaking having been given that temporary measures should be adopted for the prevention of the nuisance, consent had been given to an adjournment of the case. In addition to the £5000 placed to the reserve-fund in 1877, they, on the 13th of April last, transferred a further sum of £5000 to the credit of the same account. Works were now in progress for the purpose of obtaining a more ample and constant supply of water from Plant's Brook. The intake of waters from the River Bourne continued to proceed satisfactorily, and the waters were of excellent quality. In view of the expiration in 1880 of the powers of the Council to construct the proposed reservoir and other works at Shustoke, authorized by the Birmingham Water-Works Act, 1870, the Committee had been led to consider the expediency of at once proceeding with the construction of such works, or of applying to Parliament for an extension of the time within which they were required to be completed. To assist the Committee in the consideration of this important subject they had obtained from their Engineer (Mr. J. W. Gray) a full and complete report of the quantity of water now and prospectively obtainable from the several existing sources of supply, and also on the advisability of laying down an additional 30-inch main from Birches Green to the Monument Lane station, for the better distribution of the supply, especially to the upper and middle districts. This report was as follows:—

In 1873 I reported to the late Company that the quantity of spring water available was 7¾ millions of gallons per day. Since then ¾ million have been added by the well at Selly Oak. This gives 8½ millions of gallons as the daily quantity of water to be obtained from the wells when they are all at work. The streams then available were Perry and Witton, Plant's Brook, and the River Blythe, estimated together to yield, during dry weather, 7½ millions of gallons. Since then the waters of the River Bourne have been added; this addition will give as available at present from river sources 9½ millions of gallons. We have, therefore, available for present consumption, from all sources of supply, a quantity of water equal to about 18 millions of gallons when all engines are at work, but as it would not be safe to calculate on machinery being always available, I reduce this quantity by 2 millions, making 16 millions of gallons as available at present for all daily requirements.

In 1873 the average daily supply was 7·7 millions of gallons, and the maximum supply 9·4 millions of gallons, and I then reported that I expected more water to be used for sanitary purposes, and also that, as surburban residences were springing up all round, with gardens and pleasure-grounds, the maximum supply would increase in a much greater ratio than the average daily quantity, and that this maximum quantity must be taken in all calculations to ensure a proper supply, and should be provided for. Since 1873 the average quantity has increased from 7·7 millions of gallons per day to 8·76 millions of gallons per day this last half year, and from 9·4 millions maximum to 11 millions of gallons. As estimated by the drought of last week, this 11 millions of gallons per day is, therefore, the quantity which is now required to be supplied. The increase, therefore, on the average in five years, has been 1 million gallons per day, and the maximum 1½ million gallons per day. In 1873 I estimated the maximum daily quantity that would be required in 1882 as 16 millions of gallons, and the average daily quantity as 12 millions, but owing to more supervision having been given to the plumbing work in the town, and certain cisterns being insisted upon for water-closet supplies, and also to the assistance given by the police and other departments of the Corporation, I am of opinion that the average daily quantity required in five years will not be more than 10¼ millions of gallons, and the maximum 14 millions of gallons.

In 1870, when power was obtained to construct the reservoir at Shustoke, none of the wells were finished sinking, and the well at King's Vale, which was expected to yield so large a quantity of water, has proved almost a failure. At that time the quantity of water available from all sources, exclusive of the Tame, was 7½ millions of gallons, of which 3½ millions was well water. Now, the quantity of well water may be taken as 8¼ millions of gallons, and the wells having been pumped from for several years, show no appearance of failure in quantity or quality; and instead of 4 millions of river water, we now have 9½ millions, and instead of 7½ millions of gallons of water from all sources, we have now 18 millions. I am of opinion, therefore, that the construction of the reservoir at Shustoke need not necessarily be carried out for several years.

There are improvements which have been carried out—namely, filter-beds at Aston and Plant's Brook, which have absorbed capital provided by the several Acts of Parliament for other purposes, and further improvements, which, I think, ought to be carried out—namely, the covering of service reservoirs, will absorb further capital not provided for. These I consider of greater importance than the additional storeage of water, but should any unforeseen circumstances deprive the department of any of the sources of supply, or should the demand exceed my estimated increase of supply, all the ground necessary for the reservoir having been purchased, the works may be begun, and gradually carried on, and made available as the necessity for additional supply of water arises.

By the second part of the resolution, I am instructed to report on the advisability of laying down an additional main from Birches Green to Monument Lane.

In doing so, I think well to draw the attention of the Committee to the quantity of water at present available at Aston for the supply of the upper and middle districts. The quantity which can be obtained from Perry and Witton streams, and the wells at Aston, Perry, and King's Vale, and half of Short Heath, is altogether 8½ millions of gallons per day. Should more water be required than this quantity, it must come from Plant's Brook and Whitacre. Had the dry weather continued, I must have drawn from the storeage at Witton and Perry, or from the main from Plant's Brook and Whitacre, leading to the No. 3, or Bloomsbury, Nechells, and Deritend district. In this contingency, the working pressure over that district would have been reduced. By continuing the 30-inch main, therefore, now being laid from Plant's Brook to Birches Green, to Aston, I can, at all times, supply Aston from Plant's Brook or Whitacre, without interfering with the supply to No. 3 district, which is, I think, a sufficient reason for this short length of additional main from Birches Green to Aston.

We have at Aston six engines, and, for want of main power, have never attempted to work more than five at one time. In order to relieve these engines, and save cost of pumping water twice over, the No. 3 district was introduced, supplied direct from Plant's Brook and Whitacre, and now half of Short Heath well has been added: but, in doing so, the branch mains from the leading mains between Aston and Gosta Green were appropriated, the principal being the 12-inch at Avenue Road, and the 15-inch at Gosta Green, so that our main capacity, as well as the quantity of water passing through the Aston station, were both reduced.

Not having to pump water twice over has effected a saving of at least £2000 per annum, after paying interest on capital, but the time has now arrived when more water is required for the No. 1, or Edgbaston and Moseley district, and No. 2, or Small Heath, New Street, and Hockley district. This must be supplied by mains passing through Birmingham. Formerly, as I have said, we worked five engines regularly when required, now, owing to the reduction of main power by appropriating the branch mains to the No. 3 district, the friction is increased, and our capability of working five engines greatly hampered. So much so that without an additional main I must add at least 5 per cent. more load to engines, and run more risk as to breakage; whereas a new main will enable me to guarantee supply, and save at least 5 per cent. on present cost of pumping, by reducing the friction or head to pump against. There is no doubt as to these facts, and 10 per cent. on the cost of coal at Aston amounts to about £500 per annum.

In regard to the line of the proposed new main, Birmingham, of all the towns I know, is the most difficult to get through with large mains, there being so many canal and railway bridges, which will not allow of even small mains passing over them, the crowns of the arches being so near the surface of the roads. In the line proposed, which is comparatively straight, there are only two bridges which may require special castings. These are Salford Bridge over the canal, and Icknield Street over the canal; but I apprehend no great difficulty with them.

It is now 15 years since the last water-main was laid from Aston through Birmingham, and it may safely be considered that after this proposed new main is laid, which is nearly double the area of the last, no other leading main will be required for many years.

The Secretary (Mr. Thomas Starkey) reported that to execute the proposed works the estimated amount required beyond the present borrowing powers of the Committee would be £252,755 18s. He calculated that the rental from new supplies would increase at the rate of £3000 a year. He was of opinion it was desirable to obtain additional borrowing powers for the sum of £300,000. After careful consideration of the foregoing reports, the Committee arrived at the conclusion that it was desirable at once to proceed with the construction of the 30-inch main from Birches Green to Monument Lane, and had obtained tenders for the supply of the requisite pipes. They were further of opinion that it was not advisable at present to proceed with the construction of the reservoir and works at Shustoke, required, by the Birmingham Water-Works Act, 1870, to be completed, or in course of construction, within ten years from the passing of that Act; but that the time therein prescribed for the completion of such works should be extended for a further period of five years from the year 1880; and they recommend that they be authorized to give the necessary notices of the intention of the Council to apply to Parliament during the next ensuing session for an Act to extend the time for the construction of such reservoir and works, and for power to borrow a further sum of £300,000 for the purposes of the water-works undertaking; also that they be authorized to cause the draft of a Bill embodying the requisite provisions for such purposes to be prepared, and to submit the same to the Council for approval.

Alderman AVERY moved a resolution authorizing an application to Parliament for an extension of time for the construction of the proposed water-works reservoir at Shustoke, and for power to borrow a sum of £300,000 for the purposes of the water-works undertaking. He said it was probable that the reasons which induced the Water Committee to submit the recommendation contained in the resolution would be more readily understood if he briefly narrated the circumstances which originally suggested the construction of the reservoir at Shustoke. In the year 1870 the late Company made an application to Parliament for additional powers, varied in character and very considerable in extent, in the nature of engineering works. The powers for the creation of additional capital and borrowing powers, amounting collectively to the sum of £420,000, had been previously granted by Parliament, before the works themselves had been completely specified. The construction of the large additional works to which he had referred had become not only expedient and advisable, but absolutely necessary, in consequence of the provisions of a former statute, which provided—and properly provided—that the supply of water from the Tame for domestic purposes should absolutely cease from and after January, 1872, excepting only under certain contingencies defined by the Act. The withdrawal of that source of supply was a condition imposed upon the Company by the action of the Council in the year 1866, he believed. But the withdrawal of that service of supply rendered it strongly advisable—if, indeed, it was not absolutely necessary—that large additional engineering works should be provided as a substitute for the supply which was thus withdrawn—in other words, a bad supply was withdrawn and a better substituted. The Council would observe that the Water Committee did not propose to abandon the construction of this

reservoir. When constructed, it would possess a storeage capacity of 400 millions of gallons, or what would be required for seven or eight weeks consumption of the inhabitants of the borough and district. As their consumption was somewhat above 8 million gallons daily, in that single storeage reservoir there would be provision for several weeks consumption. But the Water Department had already a storeage capacity of about 228 million gallons, which, in the judgment of the Engineer and the Committee, was amply sufficient for the next few years. It would probably be asked, if it was unnecessary to construct that reservoir at the present, why were the powers taken, and why was the land purchased? In reply, he would say that, at the time the calculation was made—and all such calculations must be on the safe side, because they had to deal with the question of supplying a great community with an essential commodity—a large portion of the works, costing from £150,000 to £200,000, was in the nature of deep wells. When the calculation was made, the supply from deep wells was surrounded by an uncomfortable amount of uncertainty. The only well that could be relied upon was the Aston well, and it was uncertain whether the wells would stand a permanent withdrawal from day to day. This uncertainty had passed, however, and the Aston well had proved a substantial success. For many years the late Company and the Water Department had regularly drawn from this well from 2½ to 3 million gallons yearly without the least symptom of exhaustion, and the other wells had also been tested with satisfactory results. The quantity of water they had actually drawn during the month of July from the wells they had in operation was as follows:—For the week ending July 5, the Water Department derived from the various deep wells 30¼ million gallons; July 12, 31¼ millions; July 19, 31⅛ millions; July 26, 37¾ millions. That was an unusual quantity, the ordinary rate being from 18 to 20 million gallons per week. In addition to that the Water Department, by an expenditure sanctioned by the Council some two years ago, had already largely utilized one of the purposes for which the reservoir at Witton was intended—viz., to gain the control of the waters of the Bourne as a substitute for the waters of the Blythe. These works were finished in February, 1877, and since that time no water had been taken from the Blythe. The Committee considered that they could not abandon the construction of the reservoir, but postpone it for several years, as they required a greater capacity for the distribution of the waters in the shape of an additional main. Assuming that it would be prudent to postpone the construction of the Bourne reservoir for some years, not exceeding five, as the cost of the reservoir would be from £100,000 to £200,000, it would represent an economical saving of about £5000 a year, and that £5000 would enable the water department immediately to carry into effect many improvements in the actual condition of the water and its distribution. Among those works there would be the laying of a 30-inch main from Plant's Brook to Edgbaston. At the present time they had two 20-inch mains, and they found it expensive and difficult to force the water through those mains. The provision of the additional main would place them in a position of much greater security in that respect, and also represent a large saving in money. The Committee also desired to construct a stand-pipe at Edgbaston, and Lord Calthorpe had generously presented the Committee with the necessary land. There were other improvements, such as covering the Aston and Edgbaston reservoirs, the completion of the pumping-station at Selly, and the laying of new mains for ordinary water services. In the years 1874–5 the late Company laid 18¼ miles of new mains. In the years 1876–7 the Water Department laid 49 miles. In conclusion, he referred to the borrowing powers which were mentioned in the report.

Mr. WHATELEY drew attention to the fact that there were not many members present, and he thought those who were should not take the responsibility of voting away £300,000.

The MAYOR explained that borrowing power only was asked for, for the sum named, and they would not necessarily expend that sum. On every occasion the Committee would require the authority of the Council for any expenditure.

Mr. BEARD asked if there was sufficient money now at call to pay for the mains proposed.

Alderman BIGGS suggested that the Committee should be empowered to abandon that part of their powers authorizing the construction of another reservoir at Shustoke, and seek powers in a Bill to construct a reservoir on the western side of the town. In the neighbourhood of Shustoke and on the east side of Birmingham about three-fourths of the night-soil and manure was deposited upon the land, and there was danger of the water being polluted by the floods. He suggested that the Committee should ask for powers to extend their works to the neighbourhood of the Lickey Hills.

Dr. BARRATT said he regretted to hear Alderman Biggs speak in a disparaging manner as to the supply of water. He was thoroughly convinced that the supply of water which could be obtained from the district recommended by the Committee was better than any they now had in Birmingham. Before saying what he had to the Council, Alderman Biggs should have assured himself as to the accuracy of this statement, and had that gentleman gone to the Chairman of the Water Committee he would have been told the opinions given expression to were not facts.

Mr. TAIT said that when this question came up he had taken some trouble to ascertain what was the construction of the watershed on which Birmingham depended for its water supply. In a town like Birmingham it was not only the quality of the water, but the quantity and the constancy of the supply that they had to consider. By tapping the Bunta sandstone, at the west of the town, they might get a pure supply of water, but it would be a hard, insufficient, and intermittent one. These objections would at once put an end to the notion of Alderman Biggs of tapping the Bunta sandstone in that direction. It would cost many pounds to the square yard to go through the deep rocks, and they would not get a drop of water at the end. He congratulated the Water Committee that they had at length taken steps for the removal of the pollution of Plant's Brook. He should support the motion.

Alderman AVERY, in reply, said the amount mentioned in the report was in addition to the present borrowing powers of the Council; that the reservoir at Shustoke would be filled, when constructed, from the streams in the neighbourhood; and that the reservoirs proposed to be constructed were one at Aston and two at Edgbaston. He was glad to say that the Committee already had in hand sufficient money to cover all the works which they had at present engaged to construct. As to abandoning the construction of the reservoir at Shustoke, as suggested by Alderman Biggs, he reminded him that the late Water-Works Committee had spent £34,000 in purchasing the land, and if they had not done so it would have been the most prudent thing for the Council to have done so without an hour's delay. He had not the least doubt that the important district supplied by the Water Department would derive great advantages from the reservoir. They had heard from Alderman Biggs a general lamentation about the quality of the water at Shustoke, but if that gentleman would read the report of the Medical Officer of Health, he would find it stated "that the character of the water supply continues to exhibit a progressive improvement, as shown by the annual average." This showed that the water was perfectly satisfactory in its character and purity. Lastly, Alderman Biggs had reminded them of the evil consequences of these streams in times of flood. Now it was not the practice of the Water Department, at any time, to take a single pint of water during the period of floods. The whole of the water was permitted to flow away without any catching at all, thus differing in an important respect from the practice of the London Water Companies, who, he believed, usually took their water in flood times. At Birmingham, however, they had an abundant supply without using the flood water.

The motion was adopted.

Alderman AVERY then moved that the Water Committee's report be approved. He said he hoped that the Council would be of opinion that the Committee had not exceeded their powers, but that they had exercised a reasonable discretion. The present time was an advantageous one to engage in works involving an extensive use of iron, for the iron trade was in a very critical condition, and prices were exceedingly low. It was, therefore, highly desirable, in the opinion of the Committee, to carry out such necessary works without delay. During the recent hot weather the supply of water had jumped up from an average of less than 9 million gallons to more than 12 millions; but when six months had elapsed it would be the usual average. They had to make provision for the maximum, and when that maximum arrived, they found great difficulty in forcing the water along the existing mains. There was a large additional expense involved by the additional pressure, and there was also considerable risk from the engines being so excessively strained. The Engineer had advised them that the construction of the new main would result in an economy of several hundreds a year, and would prevent the serious risk through putting too great a strain on the engines. As the construction of the main could not be delayed more than two years at the most, the Committee were of opinion that it would be highly advisable to construct it while iron was at its present price, for they were obtaining two miles of mains at the same price as one mile would have cost three or four years ago. Referring to the profit and loss account, he said that the surplus profit for the six months ending the 30th of June, after charging revenue with the whole of the loss upon Watt's action at law of £900, was £1619. That sum was compared with £800 for the corresponding period of 1877.

Mr. BEARD said he was glad to hear of the thorough condition of the works, and of the admirable order observed; but when he read the report he felt a little disappointed, because the profits appeared to him to be very small. Alderman Avery, however, had explained that they had had to pay a large sum for law expenses. It was well known that the Health Committee had rendered excellent services to the Water Committee in compelling owners to close all wells where the water was unfit, and he expected that it would have created the additional revenue. The Committee, however, would not have so many of these impure wells to fall back on in the future as a means of extending the water supply and increasing revenue, and they could not rely upon the increase in the number of consumers going on at the same rate as in the past. He might further point out that the storeage of the small reservoir had been reduced to about one-third of its original capacity, whereas he should have thought that, from a practical point of view, the reservoir was essentially necessary to prevent the extra pressure in times of the maximum consumption. In regard to the extension to Edgbaston, he thought there was no help but to increase the supply, and the work would have to be done. He had hoped that the Committee would have seen their way to revise their list of charges. They were living in hard times. Trade was bad, and manufacturers had a difficulty in making the two ends meet. It was well known that they were paying 50 per cent. more for water in Birmingham than was charged by the Wolverhampton and the South Staffordshire Water Companies. He believed that for domestic purposes a house rented at from £20 to £40 a year was charged 100 per cent. more for water than by the South Staffordshire Company, and probably more than 50 per cent. more than at Wolverhampton. If the Committee could reduce the amount, it would be a great boon to the public.

Alderman BIGGS, in reference to a previous remark about the pollution of water, said that a statement was published, and went uncondradicted, that the water of the Blythe was polluted. He thought an official contradiction ought to have gone forth to have satisfied the people that their water did not come from a polluted source.

Alderman AVERY, in reply, said that for the present, and probably for some years to come, the enormous outlay on new mains, necessary to comply with the requirements of the Health Committee, would nearly—if not altogether—absorb every immediate benefit. They could, however, look forward with hope to the time when these services would be in full activity. He might mention that, in addition to carrying out all their works, the Committee had succeeded in laying by a reserve-fund of as nearly as possible £10,000. With regard to the suggestion that the Committee should revise their charges, he could say that about 28,000 or 30,000 services were in Birmingham at between 8s. and 10s. a year, or little more than 2d. a week; and, when it was recollected that the Committee had to pump water from wells ranging between 360 and 400 feet in depth, he thought it was hardly to be expected that very far greater advantages could be enjoyed. With regard to manufacturers, he wished that the Committee could make some modification in their charges to them, but when Mr. Beard compared Birmingham with other towns who had to do scarcely any pumping, he was confounding together things that differed. He believed there was not a town in England that laboured under such difficulties as Birmingham with regard to a water supply; but, taking all things into consideration, he thought there was hardly a town in England where the supply was so excellent in quality, so abundant in quantity, and so moderate in price.

The report was then approved.

LIVERPOOL WATER SUPPLY.—The Acting Committee of the Severn Navigation Commission issued a report preparatory to their annual meeting at Worcester yesterday, in which they specially referred to the proposal of the Liverpool Corporation to obtain a supply of water from the River Verniew, one of the head waters of the Severn. They say that the quantity of water proposed to be taken is estimated to amount ultimately to 52 million gallons a day, and such additional quantity as Parliament may require the Corporation to supply to any towns on the route of their aqueduct and pipes. The abstraction of this immense volume of water from the Severn watershed, and its diversion into another district appears fraught with momentous consequences to the navigation of the river, and they have placed the matter in the hands of a skilled hydraulic engineer. The Engineer to the Commission (Mr. E. S. Williams), in a report to the Committee, describes the scheme as "a most unwarrantable interference with the regimen of the river, and of the economy which nature has adopted for the regulation of its channel. As the flood tide of the Severn runs up with a velocity five times greater than the return of the ebb, the silt deposits rapidly, and its removal is due to the energy and weight of the winter floods, and so every million gallons of water abstracted from the flood waters of the Severn would leave an equal proportion of silt in the river channels and its estuary."

WEARDALE AND SHILDON WATER-WORKS COMPANY.

The Half-Yearly Meeting of this Company was held last Wednesday—Mr. H. PEASE in the chair—when the following report was presented:—

Your Directors have pleasure in submitting herewith statement of accounts made up to June 30, 1878, examined and certified by the Auditors.

The revenue account, including the amount brought forward from last half year, shows an available balance of £6084 2s. 8d., out of which your Directors recommend payment on the 9th of August, to the Proprietors registered in the Company's books on the 25th of July, of a dividend (clear of income-tax) of 10s. 6d. per share on the shares (Act 1866), 6s. 6·48d. per share on the first issue of shares (Act 1875), £19 paid, and 4s. 8d. per share on the second issue of shares (Act 1875), £13 paid, being at the rate of 4 per cent. per annum. This will absorb £5893 6s. 8d., leaving a balance of £190 15s. to be carried forward to the credit of next half year's account.

The large impounding reservoir at Tunstall is now nearly finished, and is being filled with water. This reservoir will contain 520 million gallons of water, and will bring the Company's available storeage up to 1000 million gallons, and the capability of supply to fully 3 million gallons per day. The quality of the water is excellent for all purposes.

With this work the Company's primary system of supply may be said to be completed. The Directors do not, therefore, contemplate any early further expenditure on capital account otherwise than for necessary extension of pipes.

Whilst there is a steady growth in the domestic consumption of water, the depression in the iron and coal trades has produced a diminution in the manufacturing demand. Your directors trust that some improvement in this respect may take place before interest on the Tunstall reservoir cost becomes chargeable to revenue.

The balance-sheet attached shows that during the half year £16,928 19s. 6d. was expended on capital account, raising the total expenditure on this account to £464,089 9s. 3d. The gross receipts for the half year were £7856 6s. 7d., and the expenses £1772, leaving the disposable balance of £6084 2s. 8d. already named.

The CHAIRMAN said that last half year there was a slight falling off in the revenue from water supplied for manufacturing purposes, but there had been a small increase, on the other hand, from that supplied for domestic purposes. The Shareholders would be aware that the Durham Water Company had lost their Bill in Parliament, and this had caused the Directors to look at the matter, and they had found that they could supply the Durham Company with the water they would require, and water of excellent quality. There were no mechanical difficulties that could not be easily overcome. They had obtained facts—financial and otherwise—with reference to the Durham Water Company, and should be prepared to go into the matter if the parties at Durham were desirous of negotiating with an established company having first-rate water. He concluded by moving that the Directors report and balance-sheet be received and adopted.

Mr. BURDON seconded the resolution, which was carried.

The CHAIRMAN, in reply to Mr. Burdon, stated that the falling off in the demand for water for manufacturing purposes was chiefly because of the bad state of trade. Manufacturers, except in one or two cases, had not abandoned the Company's supply for one of their own.

Mr. BURDON said there would be a prejudice against the Waskerley water in Durham unless it was filtered, and he had a strong opinion that it should be supplied into another reservoir at a lower level, and it could then be filtered.

Mr. ASKWITH, the resident Engineer of the Company, said that there was no mechanical difficulty in supplying the water and filtering it, as there would be a 200 feet fall from Stockley to Durham.

Mr. ALLISON moved—"That a dividend, clear of income-tax, of 10s. per share on the Shares (Act 1866), 6s. 4d. per share on the first issue of Shares (Act 1875), and 4s. 8d. per share on the second issue of Shares (Act 1875), be and hereby is declared, and that it be payable on Friday, the 9th inst., to the proprietors on the register of the Company on July 26, 1878." He said he thought it would be the wisest thing the Durham Company could do to come to some arrangement with this Company.

Mr. DAVISON seconded the resolution, which was agreed to.

Mr. M'NALLY moved, and Dr. PIPER seconded—"That the thanks of the meeting be given to Mr. Pease and the other Directors for their services to the Company."

This resolution was also agreed to, and the proceedings terminated.

THE LANCASHIRE COAL AND IRON TRADES.

(FROM OUR OWN CORRESPONDENT.)

There is no material change in the condition of either the coal or iron trades since last week. The former continues in a very depressed condition; and with regard to the latter, it is more in the anticipation of a better trade being done than of any substantial increase of business at present that any improvement can be reported.

Round coal, both for house-fire, gas-making, and steam and forge purposes, still moves off very slowly, and but for the general short time that is being worked, stocks would be exceedingly heavy. As it is, at several of the large colliery concerns a great deal of coal has been "rooked," and with regard to gas coal it is only in exceptional cases, and where very low prices have been taken, that colliery proprietors have placed their average quantities for the season of the year. So far as prices can be ascertained—and it is very difficult, with the large amount of underselling going on in the market, to give anything like reliable quotations—they range about as under:—Best Wigan Arley, for house-fire purposes, 9s. to 10s. per ton at the pit; qualities suitable for gas-making, about 8s. per ton; whilst common Arley can be bought as low as 7s. per ton; Pemberton four-feet, 7s. to 7s. 6d.; good ordinary screened Wigan mines for gas-making, 6s. to 6s. 6d.; and steam coal, 5s. 6d. to 6s. per ton. Engine classes of fuel are generally steady at late rates, good ordinary burgy being quoted at 4s. 6d. to 5s., and slack at 3s. 6d. to 4s. per ton at the pit mouth.

Lancashire makers of pig iron are still firm at their full list rates of 50s. to 50s. 6d. per ton for No. 3 foundry, and 49s. to 49s. 6d. for No. 4 forge, less 2½ per cent. delivered into the Manchester district; but outside brands are offered at as low figures as ever. Manufactured iron is without change, and Lancashire bars, delivered into the Manchester district, can still be bought at from £6 to £6 2s. 6d. per ton.

THE COAL AND GENERAL TRADE OF THE NORTH OF ENGLAND.

(FROM OUR OWN CORRESPONDENT.)

There was a better demand for the best qualities of gas coals last week. Shipments improved considerably. Good medium sorts of gas coals were also more in request, but inferior is not very much asked after. The price of gas coals remains about the same. The range is from 6s. up to 7s. In some instances 7s. 6d. may be asked; but 7s. per ton is the quotable figure. There has been more inquiry for good gas coals for Ireland, and steamers take cargoes of gas for Dublin, Cork, and some of the larger towns in Ireland. The steam coal trade is a little weaker, but there is a somewhat better demand for house coals.

The freight market is unchanged. There is an excess of both steamers and sailing ships for the coasting coal trade. Except for little brigs and schooners to load for the bye-ports, and where steamers cannot enter, there is little or no demand for sailing ships. Only 4s. per ton continues to be paid to steamers, and 5s. per ton, London, sailing ships. The French trade does not revive very much. French merchants and gas-works seem to have a good few coals on hand, which have been gathered together over the summer. Freights are less for all classes of vessels to load for the lower Baltic ports and for Scandinavia. A good few coals are sent to Hamburg and some of the other foreign exchanges upon consignment. Freights are higher by about 10s. per keel to Cronstadt; but that is on account of the poor home business, and not through any increased demand for coal. The coasting trade to the Mediterranean is dull.

No material change can be reported in the manufacturing business. Of course there is more confidence amongst merchants, but no more trade except for chemicals. There has been an improved inquiry in that market. A rise of something like 2s. 6d. per ton has taken place. But there is generally an improvement in the shipping business in chemicals during the latter part of August, and it is thought that this slight rise in the market is caused by merchants desiring to increase their stocks, to be able to complete their orders when the autumn business gets a little brisk. The iron trade is neither better nor worse. There are about average shipments to the Continent, but it can hardly be said that there is even a moderate revival. Prices continue low for most brands of iron.

TRADE NOTES FROM SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

The annual meeting of the Lanark Gas Consumers Company, Limited, was held on Friday, the 2nd inst.—Provost Brown in the chair. From the statement of accounts, which was submitted, and which was considered very satisfactory, there were shown considerable profits on the past year's transactions. The usual dividend of 5 per cent. only was declared, setting aside a surplus for further improvements on the works at Steel's Cross. The report by the Directors explained that an expenditure of upwards of £1500 was required to make a thorough reconstruction of these works, and provide sufficient distributing plant. It was recommended that when the reconstructions and extensions had been made, the works in Potter's Wynd should be sold, so that a better dividend would be realized for the original shareholders and a reduction in the price of gas to consumers, for under present arrangements with the two works going, there was as much loss as would pay the interest on the additional outlay.

A reduction in the price of gas from 5s. to 4s. 7d. per 1000 feet has just been made by the Musselburgh and Portobello Gas Company.

The annual meeting of the Aberlour Gas Company was held on Saturday week, when the balance-sheet and report by the Directors were submitted and approved. Much satisfaction was expressed at the progress being made to clear off the debt incurred by the Company some years ago.

At the annual meeting of the Old Meldrum Gas Company, which was held on Friday, the 2nd inst., the price of gas was fixed at 10s. 5d. per 1000 feet, which includes the cost of supplying gas to the street-lamps; and a dividend of 5 per cent. was declared. Extensive repairs have been agreed upon, which, when completed, will much improve the works.

There is every prospect that the award in the Kirkintilloch Gas-Works arbitration will be made in the course of a few days. The arbiters, Messrs. Foulis (Glasgow) and Wilson (London) acting respectively for the Police Commissioners and the Gas Company, met last Tuesday, when they agreed upon the main points in the submission.

The official Gas Examiner for the City of Aberdeen, Professor Brazier, has recently submitted to the Gas Committee of the Town Council his report upon the illuminating power and purity of the gas during the past two quarters, January to June, 1878. He visted the works at irregular intervals during the six months, and obtained the following results:—

Visit made.	First Observation.	Second Observation.
Jan. 12	30·07 candles	30·10 candles.
Feb. 16	30·25 ,,	30·25 ,,
April 6	30·25 ,,	30·25 ,,
May 24	29·90 ,,	29·95 ,,
June 8	29·70 ,,	29·60 ,,
June 29	30·40 ,,	30·50 ,,

The gas was tested on several occasions for sulphuretted hydrogen, ammonia, and carbonic acid, but never could more than traces of ammonia and carbonic acid be detected.

The adjourned meeting of the Dumfries Gas Commissioners, sitting as a Committee of the whole Council, was held last Thursday—Bailie Wood, Convener of the Gas Committee, occupying the chair. Mr. Martin, the Clerk, read minutes of the meetings of the Gas Committee held since the beginning of July, as also the minutes of the Gas Commissioners held in private on the 1st inst. He likewise submitted a letter which he had received from Mr. M'Crae, declining to produce certain letters sent to him by Bailie Wood, as Chairman of the Committee, that were supposed to have warranted him in suggesting that Mr. Malam, the Gas Manager, should be excluded from the works for a given period, unless a proper improvement were to take place, and a neutral party put in his position, in order to ascertain exactly the cause of the deficient yield of gas which had been complained of in the Committee. According to the letter, Mr. M'Crae believed that the public would never comprehend nor appreciate Bailie Wood's earnestness in the matter, that the request to produce letters from that gentleman implied a want of confidence in both of them, and that he declined to act any further as the adviser to the Committee, but would be willing to visit Dumfries and make any personal explanations that might be necessary. The meeting seemed to be almost unanimously opposed to the idea of continuing Mr. M'Crae as the professional adviser to the Committee in any shape; and it was suggested, in order to have a more satisfactory state of affairs at the works, that the Manager should be relieved from the irksome vigilance of Bailie Wood, by Mr. Shortridge being made Chairman of the Gas Committee in his stead. After some discussion, the matter was adjourned for a week, so as to give Bailie Wood an opportunity of producing another letter from Mr. M'Crae. It is but fair to Bailie Wood to say that in the course of the discussion he made use of the following remarks:—"There is nothing to conceal, and there is nothing but an anxiety on my part to do the very best I can for the town of Dumfries, and assist your Manager, whoever he may be, in obtaining the very best results possible. I cannot tell whether I can lay my hands on the letter; but perhaps Mr. M'Crae would keep a copy of it, and I will certainly ask him, as a personal favour, to produce all the correspondence, when I think you will find you have been making a mountain out of a mole-hill."

A special meeting of the Hamilton Town Council, sitting as the Gas Commission, was held last Wednesday, when the report submitted to the ordinary meeting, held in the preceding week, was considered. Before going on to consider the proposed extensions of the works, as recommended by Mr. Barr, C.E., it was agreed to hear Mr. Henry Aitken, of Falkirk, in reference to the proposal of the Manager, Mr. Johnstone, to remove the gas analyzer used in that gentleman's patent process. Mr. Aitken said he was surprised at the report as to the removal of the analyzer, as he had heard nothing previously but favourable reports. These were given him by five of the best qualified men in Scotland to report on such a subject, and also by Dr. Wallace, who was the first authority in Scotland upon gas matters. These reports were all to one effect, that there was a saving effected; or, rather, an increase in the sperm value of something like 20 per cent. As far as he was aware, this result was still continuing. About three weeks ago he had a letter from the Manager, telling him that there

was an accumulation of naphtha in the meters and also in the pipes. He replied that he would call the next time he was at Cadzow, and he did so, but, unfortunately, he did not find Mr. Johnstone in. He then wrote him that the accumulation was quite usual all over the country in dry meters, especially where shale was used; and, on inquiry, he had found it to exist under the ordinary process of gas-making in Glasgow, Helensburgh, Lanark, and other places. The analyzer, therefore, was not in any way, in his opinion, to blame for it. Mr. Aitken produced a letter from Dr. Wallace, in which he expressed astonishment that the Town Council were to give up the process after the success that had attended the trial of it, on a large scale, at their works. As to the deposit of naphtha and tarry matter in the pipes and meters, they found the same thing in Glasgow under the ordinary system, and he believed the same would be found in every town where gas of 26 candles or upwards was made. If the quality was reduced to 22 or 24 candles, he thought probably the deposit would be lessened or altogether prevented. In regard to the question in what places the process had been adopted, Mr. Aitken said with the exception of Hamilton, and portions put up to test the process at Kilmarnock and Greenock, they had nothing as yet in Scotland, although they were to begin its use in Lanark immediately. There were numerous other parties in this country, and in England, and on the Continent, who had been in correspondence, and in Austria there were one or two places where it was in use. In America there were over a dozen, if not twenty, works where the process was working; not, perhaps, on the same scale as they had it here—there was only one works doing it—but working a modification of it, and getting very good results. Bailie Cassels said the Committee were not at all anxious to press on the matter, and it was agreed to delay consideration of the proposal to remove the analyzer. In reference to the extensions of the works recommended by Mr. Barr, Bailie Cassels stated that the Committee had employed Mr. Stewart to report on the subject. The report which was read approved of Mr. Barr's recommendations, and also condemned the proposal to remove the analyzer, which was of great value in economizing the use of high-class coals. Except as to the removal of the analyzer, the Committee's report was ultimately approved of, one of the recommendations being that the price of gas be reduced from 4s. 2d. to 3s. 9d. per 1000 cubic feet.

With the exception of a momentary improvement last Tuesday, the Glasgow pig iron market was again very dull during the past week. At present there is but small promise of any immediate improvement. The exports continue to compare most unfavourably with those of the corresponding period of last year, while the imports of Middlesbrough pig iron steadily increase. At the close of the market on Friday there were buyers at 49s. 10½d. cash, and 50s. one month, and sellers at 50s. cash, and 50s. 1½d. one month. Manufactured iron is the only favourable point in the trade. The improvement continues, and shows signs of extending still further.

There is no improvement to note in the coal trade. Any small orders that are offering are actively competed for, and they are taken at very low rates.

Newry Gas-Works Purchase.—At the meeting of the Town Commissioners of Newry on the 6th inst., it was announced that a loan of £32,000 at 4½ per cent., to be repaid by 80 half-yearly instalments, had been obtained from the United Kingdom Temperance Assurance Company, for the purpose of carrying out the purchase of the gas undertaking. A cordial vote of thanks was given to Mr. J. O'Hagan, J.P., through whose instrumentality the business had been transacted.

Albo-Carbon Light Company, Limited.—Under this title a company was registered on the 25th ult., with a capital of £24,000, in £50 shares, for the purpose of acquiring from the inventors the letters patent No. 2860, dated July 26, 1877, for improvements in means and apparatus for applying heavy oils to illuminating purposes; and No. 244, dated Jan. 18, 1878, for improvements in the production of combustible gas, and in the enrichment thereof, for illuminating purposes, and apparatus therefor.

Whitworth Vale Gas Company.—The report of the Directors for the half year ending the 29th of June states that during the six months there has been an addition of 32 to the number of consumers; but the gas-rental, through the long depression in trade, is less than in the corresponding period of the preceding year by £579 12s. 5d. The balance-sheet shows a profit on the six months working of £453 10s. 1d., and with the balance of £595 16s. 2½d. brought from the last half year's account, there is a total disposable balance of £1049 6s. 3½d. The Directors recommend that out of this sum a dividend be declared at the rate of 10 per cent. per annum on the original shares, and 7½ per cent. per annum on the amount called up on the B shares, free of income-tax, which will absorb £774 12s. This is the same dividend as was paid the previous half year.

Brampton Gas Company.—The annual meeting was held on the 1st inst., when, from the report which was presented, it appeared that the profits of the year ending the 30th of June last amounted to £210 3s. 7½d., which, added to the amount of last year's balance on hand, £164 6s. 1½d., indicated a total balance of £374 9s. 9d., out of which the Directors recommended that a dividend of 6 per cent. be declared, free from income-tax, leaving £194 9s. 9d. to be carried to the credit of next year's account. The Directors reported that the whole of the works had been thoroughly examined, and put into an efficient state of repair and working order, by the new Manager (Mr. Samuel Rutter), during the six months he had had them under his charge. He recommended that the new scrubber, which had not hitherto been used, be completed, whereby much purer gas would be produced, and a saving in the lime account effected.

Presentation to Mr. Stuart Walker, of Berwick.—On Saturday, the 20th ult., a number of the inhabitants of Berwick-on-Tweed met and presented Mr. Stuart Walker, who for the last 13 years has been Collector to the Gas Company, with a testimonial consisting of a handsome writing-desk and a purse of £30. The inscription on the writing-desk was—"Presented to Mr. Stuart Walker, along with a purse of gold, as a mark of respect from the public of Berwick-on-Tweed, July 20, 1878." Mr. Hall, Manager of the Company, spoke of the efficiency and affability with which Mr. Walker had discharged his duties, while Mr. Lawrie, Borough Surveyor, also spoke of his civility and attention. Mr. Walker expressed his acknowledgments for the gifts in a very feeling manner, and said he should always look back with pleasure upon his sojourn in Berwick, marked as it had been by many kind friendships and much pleasant intercourse with sympathizing acquaintances.

The Gas Supply of Salterhebble.—The question of the supply of gas to this place, referred to in last week's "Circular to Gas Companies," has been settled in a satisfactory manner by a resolution having been come to on the part of the Elland Gas Company, to supply the district at the price that is charged in Halifax—namely, 3s. 4d. per 1000 feet, the discount, however, being slightly different—a penny in the shilling to be allowed on all accounts paid within one month. The general feeling of the Halifax Corporation Gas Committee was that it was very doubtful indeed whether it would have paid the Corporation to have supplied the district with gas. The Chairman of the Committee (Alderman Riley) had ascertained on good authority that the total amount received for gas for the whole district for the quarter ending June 30, 1878, was only £28 12s. 11d., and that the total amount for 1877 was ~~£254 17s. 11d.~~, which was very much under what the Committee, in the first instance, thought it would amount to.

Halifax Corporation Gas-Works.—The *Halifax Guardian* of the 3rd inst. says: "On Wednesday, a meeting of the Gas Committee was held at the gas-works for the purpose of witnessing the starting of the new tower scrubber, which has been erected by Messrs. R. Dempster and Sons, of Elland. The proceedings commenced by the Mayor opening the inlet-valve, and the Chairman the outlet-valve, whilst the Vice-Chairman closed the bye-pass valve, after which a number of the Committee, including the Mayor, ascended the spiral staircase to the top of the scrubber in order to adjust the water supply to the scrubber. The Committee afterwards proceeded to view the new works, the buildings of which are drawing near completion, and then back through the old works to the Manager's office, where they were entertained by the Chairman at luncheon. The new scrubber is 60 feet high from the top of the foundations to the floor of the balcony. Upon the top of the scrubber is a machinery room about 10 feet high, exclusive of weather vane, and round the outside of the machinery room there is a balcony about 2 feet 6 inches wide. The ascent to the balcony is by a spiral staircase up the side of the scrubber, and the inside of the scrubber is filled with boards on edge, side by side, and placed so as to cross each other every tier, on what is known as the Livesey principle. The gas is admitted at the bottom, whilst a quantity of water is admitted at the top, which falls in the form of rain, and trickles down the sides of the boards, and is thus brought in intimate contact with the gas. By this means the ammonia is abstracted."

Diss Gas Company.—The annual meeting of this Company was held on Tuesday last—Mr. J. H. Bobby in the chair. The accounts presented by the Secretary (Mr. H. E. Garrod) showed that at the last meeting there was a balance in the bank of £747 9s., which, with arrears for gas consumed, amounted to £967 10s. 6d. The total receipts this year, including the above balance, realized £2474 7s. 7d., against £2295 7s. 6d. last year, showing an increase of nearly £180. The expenses had been unusually heavy, in consequence of an outlay for new retorts and expenses connected therewith, and also for a new station-meter. After meeting these expenses, there remained a balance in the bank of £625 9s. 2d. The profit and loss account showed a balance of profit on the year's transactions of £370 15s. 5d. The Chairman moved that the accounts be passed, and Mr. Cupiss seconded the motion. The Chairman said the Directors recommended a dividend at the rate of 10 per cent., the Secretary adding that this would leave about £20 on the balance of profit for the year. On the motion of Mr. J. Aldrich, seconded by Mr. Quadling, this was unanimously agreed to. The outgoing Directors were the Rev. C. R. Manning, Messrs. Burrows, Bobby, and Cuthbert. The three former were re-elected, and Mr. Copping was elected in the place of Mr. Cuthbert. Mr. James Alger was also elected a Director. Mr. J. Aldrich was re-elected Superintendent, at a salary of £25 per annum, his services being very warmly acknowledged. Messrs. A. C. Haylett and David Newson were re-elected Auditors, at salaries of two guineas each, and a vote of thanks was accorded to the Chairman for presiding.

Cleveland Water Company.—The twentieth half-yearly meeting of this Company was held at the offices, Saltburn-by-the-Sea, last Friday—Mr. J. T. Wharton in the chair. The Directors report stated that the Lockwood storeage reservoir and the filter-beds connected therewith were completed a few days ago, having occupied nearly five years in construction. Since the commencement of the Company £74,532 4s. 10d. had been spent on capital, although only £1834 19s. 5d. had been disbursed during the past six months. On the revenue account, £3262 1s. 10d. had been received from Jan. 1st to June 30th, which included a small balance from the previous half year; working expenses and preferential interests require £1139 7s. 3d.; thus leaving £2122 14s. 7d. as disposable balance. On the motion of the Chairman, it was resolved that the Directors report and statement of accounts for the half year ending June 30 be adopted. He gave some statistics of the working of the Company during the past half year as compared with the corresponding six months, and said he regretted that the Directors were unable to recommend the ordinary dividend. The falling off had been noticeable in every department, and in none more so than in the building trade. He had, however, to propose without interfering with the reserve-fund of £2570, that a dividend at the rate of 7½ per cent. per annum on the original and A shares, and at the rate of 5½ per cent. per annum on the B shares, be declared payable, free of income-tax, for the past half year. This was seconded by Mr. Knott and unanimously agreed to. The Chairman intimated that some of the debentures of the Company would mature shortly, and it was proposed to pay them off by making two or three small calls on the B issue of capital. A vote of thanks, on the motion of Mr. Snaith, seconded by Mr. Bungay, was awarded to the Chairman and Directors, and the meeting terminated.

Register of New Patents.

1246.—Young, W., Clippens, N.B., "*Improvements in the destructive distillation of coal and other bituminous substances, the same being in part applicable to the manufacture of oil and gas.*" Patent dated March 29, 1877.

This invention consists—

1. In producing or inducing the decomposition or destructive distillation of coal, shale, or other bituminous substances, or other substances used for the production of oil or gas, by causing a rapid agitation or circulation of the volatile products inside the retort or other distilling or decomposing vessel, either by means of mechanical pistons or by the agency of jets of compressed gas, steam, or vapour, with the object of bringing about a more regular and equal decomposition into oil or permanent gas, as may be desired, of the elements of the coal or other substance, and in some cases in increasing the volume of gases by the decomposition of steam or vapours employed to produce the current, and also by blending or combining or carburetting the gases injected (to produce the currents), whilst in rapid agitation or circulation in contact with the products of decomposition. The retorts or distilling vessels may be set vertically or horizontally, provided that arrangements are made for a rapid agitation or circulation of the products of distillation through or over the substance being or to be distilled.

2. In improved means or methods of producing a rapid separation of those condensable hydrocarbons from the crude gases which it is desirable to remove in the liquid form, and at the same time retaining in the gases the vapours of the hydrocarbons, which are valuable for imparting to the gas a high illuminating power. This is accomplished by causing the gas to pass through narrow passages kept heated, these passages being preferably of a tortuous nature, causing the gas to impinge or flow alternately from side to side, or by causing the crude gases to impinge in narrow or minute streams against heated surfaces; or alternately the crude gases themselves may be first highly heated, and then passed through narrow passages, or impinged against surfaces, whilst in this heated state, or by distributing the gases and causing them to pass through

small tubes or perforations in a series of trays containing the condensed tars and other matters, through which the gases are made to bubble by covering the small tubes or openings in the trays with moveable caps or covers, such caps or covers being made of thin metal or other substance, in order that the gas may lift them and cause them only to dip to a limited extent in the tarry condensed matters, the gases and tars being kept in a heated state.

3. In sealing or luting the covers or doors of retorts or distilling vessels, more particularly of retorts used in the distillation of shale or other bituminous substance for oil, by having the door and the retort mouth turned, planed, or otherwise faced, and a groove either in the door or retort mouth, or in both, into which steam or compressed gas is passed at a pressure exceeding that inside the retort or distilling vessel.

4. In so arranging the method of conducting the distillation of shale or other bituminous substance for the manufacture of oil that the charging and discharging doors may be closed by lids or covers similar to that employed in coal gas manufacture, and known as Morton's self-sealing lids. This part of the improvements is effected by having the outlet for the products of distillation placed immediately at the doors or openings of retorts, so that any air that may find its way into the retort does not require to pass through the substance being distilled, and at the same time the outlet is kept so low that any oil condensed on the lid runs into it, an exhaust being, by preference, kept on the retort during the time it is in action.

1250.—Brinjes, J. F., Whitechapel, "*Improvements in machinery or apparatus for raising, forcing, and exhausting water and other liquids; also air and gases.*" Patent dated March 29, 1877.

This invention relates to a peculiar construction and arrangement of rotary apparatus to be employed as a pump for raising, forcing, and exhausting water and other liquids, also air and gases, and has for its object the simplifying the construction of such apparatus, whilst at the same time its efficiency is increased.

According to this invention, a hollow stationary cylinder is employed, with inlet and outlet orifices on one side, separated by a stationary web or diaphragm secured to and forming part of the general casting. In the end covers of this cylinder works centrally a rotary shaft, carrying one or more eccentrics or cranks, which impart a gyratory motion to a cylindrical-shaped piston of the same length as, and working inside, the fixed cylinder. The longitudinal axis of this gyratory piston is disposed parallel to the axis of the cylinder, and the diameter of the piston must be smaller than that of the interior of the cylinder, so that there shall be only one line of contact between the outer circumference of the piston and the inner circumference of the cylinder. On the side of this piston nearest to the inlet and outlet apertures, and extending throughout its entire length, there is cast, or otherwise formed, a hollow chamber, disposed either inside or outside the circumference of the piston, such chamber having a long narrow slot or mouth, with rounded lips made in its outer portion in order to admit the stationary or fixed diaphragm, which extends or projects some distance inside the chamber (according to the throw of the actuating eccentrics or cranks), the piston when in action being caused to gyrate, and to move freely to and fro on such stationary diaphragm, which is entirely separate and distinct from the piston. As the shaft is rotated the piston is caused to gyrate inside the cylinder, and will consequently form a partial vacuum, which will tend to draw in water, air, or other liquid or gas through the inlet aperture, whilst the same is expelled by the gyratory motion of the piston through the outlet orifice. The ends of the piston may be packed, so as to work more or less fluid-tight against the cylinder covers or ends, by a metallic or other end packing; it is preferred, however, to use a packing-ring of a V section, let into an annular recess made in one or both ends of the piston.

1272.—Pawson, W., Grantham, "*Improvements in valve and ball cocks or taps.*" Patent dated March 31, 1877.

In carrying out this invention the following arrangement is mainly adopted, taking as an instance the screw tap. The chamber for the valve is somewhat lengthened, and in the same is placed a ball of rubber or elastic material resting against the seat. The screw spindle, which in ordinary screw taps is provided with the valve, terminates in a cup-shaped piece, which closes right over the ball, and so prevents it finding its way into the outlet opening of the cock or tap. Thus, by these arrangements, when the cock is closed, the ball rests firmly on its seat. When the cock or tap is to be opened, it is unscrewed in the ordinary way, and the pressure of the water forces the ball of india-rubber or elastic material from its seat, the cup-shaped portion of the screw-spindle guiding, as it were, the ball, and preventing it from going into the outlet opening. It is evident that the cock or tap may, in some cases, be made self-closing. This is done by the pressure of the water holding the valve to its seat.

1287.—Wotherspoon, J., Glasgow, "*An improvement in the construction of cocks or taps.*" Patent dated April 3, 1877.

This invention has for its object to provide a tight-fitting seating for the plug to turn in, and one less liable to wear and tear than metal, also practically unaffected by steam, or by the liquids passed through.

It consists in lining the barrels with asbestos millboard, by preference saturated with oil. The millboard is cut into the required shape, and then pressed in the space in the barrels to receive it. In place, however, of lining the barrels, the plug may be covered with the millboard, which is secured thereto by pinching rings or straps, or their equivalent, and in place of using asbestos millboard, millboard formed of other materials may be employed. Under another method of applying asbestos millboard, it is cut into rings of the required dimensions, which are pressed both in to the barrels and on to the plugs, being tightened endwise by pinching-nuts. In this manner both the barrels, as well as the plugs, may be lined or covered with asbestos, which, being compressed, may be turned, polished, and ground, so as to fit one another without leakage.

1299.—Clark, A. M., Chancery Lane, London, "*An improved gas-lighter.*" A communication. Patent dated April 2, 1878.

This invention relates to a portable torch or device for lighting gas and other flames in houses and other buildings for illuminating purposes, and consists in making such a torch or gas-lighter with a hollow stem or handle, with a tubular discharge nozzle at its upper end, and with an adjustable air-opening near its lower end. All the parts are so arranged that upon connecting the discharge nozzle, by a suitable flexible tube, with a gas-burner the whole instrument may be filled with gas, which may afterwards be utilized, when ignited at the outlet of the nozzle, for lighting chandeliers and the like. It also consists in combining with the instrument a key or wrench for opening the gas-cocks of the burners.

APPLICATIONS FOR LETTERS PATENT.

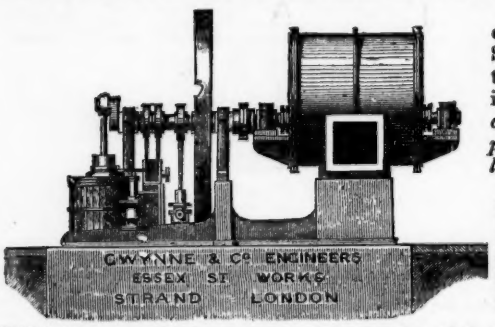
3051.—Calderwood, J., and M'Cutchon, W., West Calder, N.B., "Improvements in or connected with the furnaces or heating apparatus of retorts and stills for obtaining or treating mineral oils or gas, and also applicable to steam-boilers and to other boilers or evaporating vessels." Aug. 2, 1878.

3056.—Leichsenring, H. R., Grossenhain, Germany, "Improvements in and relating to engines worked by gas or other fluid, partly applicable to apparatus for compressing fluids." Aug. 2, 1878.

3068.—Kesseler, C., Berlin, "Improvements in self-regulating gas-burners." A communication. Aug. 3, 1878.

The GRAND MEDAL of MERIT at the VIENNA EXHIBITION, and TWO MEDALS at the PHILADELPHIA EXHIBITION, have been AWARDED to GWYNNE & CO. for GAS-EXHAUSTERS, ENGINES, and PUMPS; Also 27 OTHER MEDALS AWARDED at all the GREAT INTERNATIONAL EXHIBITIONS.

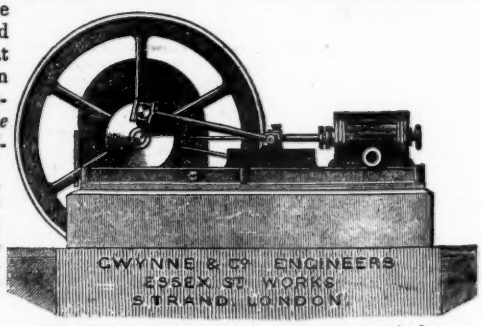
GWYNNE & BEALE'S PATENT GAS-EXHAUSTERS & ENGINES.



EXHAUSTER with Trunk Engine, capable of passing 210,000 cubic feet per hour.

The Judges report on the combined Exhauster and Steam-Engine exhibited at the Philadelphia Exhibition is—"*Reliable compact Machine, well adapted for the purpose intended, of excellent workmanship.*"

GWYNNE & CO. have made the largest and most perfect Gas-Exhausting Machinery in the world, and have completed Exhausters to the extent of 7,000,000 cubic feet passed per hour, of all sizes from 2000 to 210,000 cubic feet per hour.



52,500 EXHAUSTER, with Horizontal Engine combined.

GWYNNE & CO. do not pretend to enter into a struggle with other makers in respect to cheapness. They have never sought to make price the chief consideration, *but to produce machinery of the very highest quality, and most approved design and workmanship.* The result is that in every instance their work is giving the fullest satisfaction. Numerous testimonials and references can be given to Companies using their Machinery for years past.

Exhausters, with or without Engines combined, can be made to pass the gas without oscillation or variation in pressure Regulators, Bye-Passes, Stop-Valves, Gas-Valves, Station Governors, and Gas Machinery of all Sizes.

PLEASE ADDRESS IN FULL, GWYNNE & CO., Hydraulic and Gas Engineers, ESSEX STREET WORKS, VICTORIA EMBANKMENT, LONDON, W.C., ENGLAND.

Gwynne & Co.'s New Catalogue on Gas-Exhausting and other Machinery may be obtained on application at the above Address.

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Beg to call the attention of Gas Engineers to the fact that the novel and original feature in connection with PEEBLES' SYSTEM OF CONTROLLING THE ACTION OF GAS GOVERNORS is the loading or acting on the Bell by Pneumatic Pressure instead of Weights.

TAY WORKS, BONNINGTON, EDINBURGH.

WANTED, Readers of the Pamphlet, "Cooking and Heating by Gas;" on Burners, &c. Copies, by post, Threepence, direct from the Author, MAGNUS OHREN, Gas-Works, SYDENHAM, S.E.

WANTED immediately, a Single Man as STOKER for the Spilsby Gas-Works.
Apply, stating age, references, wages required, &c., to Mr. T. THIMBLEBY, Secretary, Gas Company, SPILSBY.

WANTED immediately, a good Stoker. Wages from 4s. 6d. to 6s. per day, according to quantity of gas produced.
Apply, with references, to Mr. G. SMEDLEY, Gas-Works, BUXTON.

WANTED, a Gas-Maker—a steady strong Young Man to take charge of a small Gas-Works at a Public Institution in Surrey.
Apply, by letter, stating wages required, &c., to STRODE AND CO., 48, Osnaburgh Street, LONDON, N.W.

WANTED to Purchase, a Station-Meter, for Works supplying from 3000 to 5000 feet per hour. Must be guaranteed in first-rate condition, and delivered free at Hull.
Apply to MARTIN SAMUELSON, Civil Engineer, HULL.

WANTED, by Samuel Thompson & Co., Colliery Office, Lancaster, APPLICATION for PRICES from Gas Managers who are prepared to receive Tenders for GAS COAL or CANNEL.
John Leigh, Esq., M.R.C.S., F.C.S., &c., &c., in his analytical report of S. T. & Co.'s Coal, says: "It is remarkable for its purity, I have scarcely ever examined a Coal containing so small a quantity of ash, and when Cannel of the best description is scarce, it may well replace this material."

WANTED, a Working Manager, to take charge (single handed) of a small Gas-Works, and occasionally lay Service-Pipes. Cottage, rent free, on the Works.
Apply to GEO. WHITMAN, Aspley, near Woburn, BEDS.

WANTED, by the Advertiser, a Situation as MANAGER in a small Gas-Work. Understands Main and Service Laying, Gas-Fitting, Internal Fitting, and Retort-Setting. Twelve years good character.
Apply to Mr. ARTHUR BROADBERY, Ramsey, HUNTINGDONSHIRE.

WANTED, New or Second-hand, an ENGINE and EXHAUSTER, with or without Boiler combined, for Gas-Works making about 56,000 cubic feet of Gas in the 24 hours.
Particulars as to price, capacity, &c., to be sent to J. MEARNS, Gas-Works, Banbridge, IRELAND.

WATER INSPECTORS.

WANTED, two competent Water INSPECTORS, capable of doing Repairs to Fittings, &c.
Apply to the ENGINEER, Corporation Gas and Water Works, BIRKENHEAD.
Aug. 1, 1878.

A BARGAIN.

FOR SALE—Seven New Iron Retorts, 7 ft. 6 in. long by 13½ in. by 12½ in. Weight. 18 cwt.
Apply to the MANAGER, Gas-Works, St. Neots, HUNTS.

THE Pinner Gas Company invite Tenders for the Purchase of TAR and AMMONIACAL LIQUOR made at their Gas-Works.
For further particulars, apply to Mr. ELI BULL, Manager, Gas-Works, Pinner, near WATFORD.

WANTED, a steady, sober, industrious STOKER; one able to read and write, with a knowledge of working a small engine and exhauster preferred. Constant employment. Wages 24s. 6d. per week; overtime paid.
Apply to T. H. BOUTTELL, Manager, Gas-Works, SLEAFORD.

ON SALE—A Station-Meter (with new Drum), capable of passing 10,000 cubic feet per hour, with Hydraulic Valves, Bye-Pass, &c.; 10-in. Connections. Has been removed to make room for one of larger capacity.
For particulars and price, apply to GEORGE NEWTON, Gas-Meter Manufacturer, Union Street West, OLDHAM.

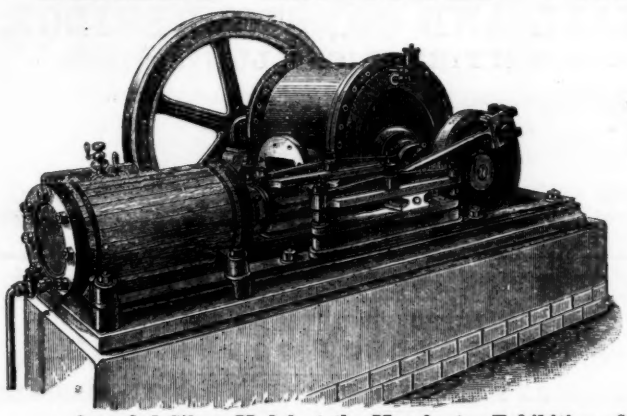
FOR SALE – One 50 ft. by 14 ft. Gas- HOLDER, nearly new, with Columns and Girders. Price £225, a bargain.
Also a STATION-METER, in good working order, to pass 15 000 feet per hour; and Four 10 ft. PURIFIERS with Hydraulic Centre-Valve.
Apply to J. S. REEVES, Manager, Gas-Works, BILSTON.

METER, GOVERNOR, AND BYE-PASS VALVE.

TO BE SOLD – One Meter to pass 2000 feet of Gas per hour, One 5-in. dry GOVERNOR, and One 4-in. BYE-PASS VALVE; all in good condition. Sold in consequence of enlarging Works.
No reasonable offer refused.
Apply to the SECRETARY, Gas-Works, Bourn, LINCOLNSHIRE.

HENRY LYON (14 years Engineer and Manager of the largest of the Manchester Corporation Gas-Works) Mechanical and Consulting Gas Engineer, reports upon the condition and value of Gas-Works, supplies plans and specifications of all Apparatus appertaining to Gas-Works, and re-models existing Works.
Address Brooklyn, near Halliwell Lane, Cheetham Hill Road, MANCHESTER.

BEALE'S IMPROVED PATENT GAS EXHAUSTERS



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TAR, LIQUOR, AND OTHER PUMPS,
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Awarded Silver Medal at the Manchester Exhibition of the Society for the Promotion of Scientific Industry.

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HYDRATED PURIFYING MATERIAL.

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THE MITCHAM AND WIMBLEDON DISTRICT GASLIGHT COMPANY.

INCORPORATED BY ACT OF PARLIAMENT, 1867.

NOTICE is hereby given that the TWENTY-THIRD ORDINARY HALF-YEARLY GENERAL MEETING of the SHAREHOLDERS of this Company will be held in the Board-Room at the Works, Mitcham, in the County of Surrey, on TUESDAY, the 27th day of August, 1878, at Three o'clock in the afternoon precisely, to declare a Dividend for the half year ending the 30th day of June, 1878, and for general business.

The Transfer Books will be closed from the 12th until the 27th day of August inst.

By order,
BENJAMIN GREEN, Secretary and Manager.
Board-Room, Mitcham, Surrey, Aug. 7, 1878.

BARNET DISTRICT GAS & WATER COMPANY.

NOTICE is hereby given that the ORDINARY HALF-YEARLY GENERAL MEETING of the PROPRIETORS of the above Company will be held at the Guildhall Tavern, Gresham Street, in the City of London, on FRIDAY, the 30th day of August, 1878, at One o'clock in the afternoon precisely, to receive the Report of the Directors, and the Accounts for the half year ending the 30th day of June last, to declare a Dividend, to transact the general business of the Company, and to consider and determine as to the passing of a resolution or resolutions for the conversion or consolidation into General Capital "A" Stock of the Company of 1850 fully paid-up shares of £10 each, forming part of the original capital of the Company, such stock to be divided amongst the holders entitled to the said shares, according to their respective interests therein.

The Transfer Books will be closed from the 17th to the 30th inst., both inclusive

By order of the Board,
ALFRED LASS, Secretary.
Offices, 30, Gracechurch Street, London,
Aug. 2, 1878.

DARWEN CORPORATION GAS-WORKS.

TO COLLIERY PROPRIETORS AND OTHERS.
TENDERS FOR CANNEL.

THE Gas Committee of the above Corporation are prepared to receive TENDERS for from 500 to 1000 Tons of CANNEL delivered at the Darwen Station.

Conditions and forms of tender may be obtained from the undersigned.

Tenders, endorsed "Tender for Cannel," to be addressed to Charles Costeker, Esq., Town Clerk, Darwen, on or before Tuesday, Aug. 27, 1878.

THOMAS DUXBURY, Manager.
Gas-Works, Darwen.

THE Middleton and Tonge Improvement Commissioners are prepared to receive TENDERS for the Supply of about 4000 Tons of Good GAS COAL per annum, for One, Two, or Three years. The Coal must be well screened, and free from dirt, shale, bind, or any other impurity, and be delivered at the Railway Station, or at the Gas-Works, in such quantities (carriage free) as the Commissioners or their Manager may require.

Sealed tenders, addressed to the Chairman of the Gas Committee, to be delivered at the Office of the Clerk on or before Tuesday, the 20th inst., endorsed "Tender for Coal."

Further information may be obtained from the Gas Manager, Mr. Hartley.

The Commissioners do not bind themselves to accept the lowest or any tender.

FREDERICK ENTWISTLE,
Clerk to the said Commissioners.
Commissioners Rooms, Gas Street, Tonge,
Middleton, near Manchester, Aug. 9, 1878.

BOROUGH OF HALIFAX.

TO IRONFOUNDERS, &c.

THE Gas Committee of the Corporation of Halifax hereby invite TENDERS for the following:—

Contract No. 3.—For the Supply and Erection of Hydraulic Mains, Ascension-Pipes, Cast-Iron Mains, Valves, and other fittings necessary for the fitting up of a Bench of 140 Retorts.

Contract No. 4.—For the Supply and Erection of a Horizontal Flat Screw Condenser, consisting of 14-in. Socket and Spigot Pipes, Cast-Iron Stands, and cross Brackets, Inlet, Outlet, and Bye-Pass Valves, &c.

Contract No. 5.—For Designs and Tenders for a duplicate set of Exhausters, each set to be capable of passing 60,000 cubic feet of Gas per hour, with Bye-Pass, Inlet and Outlet Valves, Governor, Pressure and Vacuum Gauges complete.

Contract No. 6.—For the Supply and Erection of two Steam Boilers, 16 feet long and 7 feet diameter, each having two Flues, 2 ft. 9 in. diameter, with Gauges, Valves, and other Mountings complete.

Contract No. 8.—For the Supply and Erection of six 20 feet square Purifiers, and wrought-iron Covers, with two Four-way Valves, one Centre-Valve, Slide-Valve, Connections, Lifting Apparatus for Hoisting the Lids, &c., complete.

Contract No. 9.—For the Supply and Erection of one Station-Meter, to pass 60,000 cubic feet of Gas per hour, with Valves and Connections.

Specifications, forms of tender, and any further particulars, may be obtained on application to Mr. William Carr, Engineer at the Gas-Works.

Sealed tenders, properly endorsed, to be sent to me on or before Thursday, the 22nd day of August next.

A. C. FOSTER, Town Clerk.
Town Hall, Halifax, July 27, 1878.

TO INVENTORS AND PATENTEES.

MR. W. H. BENNETT, having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their invention may be secured for Six Months; or LETTERS PATENT, which are granted for Fourteen Years.

Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.

Patents procured for Foreign Countries.

Information as to cost, &c., supplied gratuitously upon application to the Advertiser, 22, Great George Street, WESTMINSTER.

TENDERS FOR TAR.

THE Directors of the Cork Gas Consumers Company invite TENDERS for their Surplus TAR for One year, from the 1st of September next. Probable quantity 120,000 to 140,000 gallons. Delivery on Company's Works, filled into purchaser's vessels. Payments, cash monthly.

Tenders will be received on or before the 30th of August next.

By order,
DENNY LANE, Secretary.
Company's Offices, 72, South Mall,
Cork, Aug. 10, 1878.

WIDNES GAS-WORKS.

THE Widnes Local Board invite Tenders for the Purchase of the TAR and AMMONIACAL LIQUOR produced at their Works for a term of Twelve months, from the 1st of October next.

Tenders, endorsed "Tar," or "Liquor," as the case may be, and addressed to the Chairman of the Gas and Water Committee, to be delivered at the above Works (where conditions of contract can be obtained) not later than Ten a.m. upon the 2nd of September next.

The Board do not bind themselves to accept the highest or any tender.

HENRY ROBERTS.
Public Offices, Widnes, Aug. 9, 1878.

FORMBY GAS-WORKS.

CONTRACT No. 2.

THE Formby Gas Company, Limited, are prepared to receive TENDERS for the Supplying, Erecting, and Fitting of GASHOLDER and Cast-Iron TANK, Plant and Apparatus, Pipe Connections, Valves, &c., and the various matters and works in connection therewith, more particularly set forth in the drawings and specification.

Copy of bill of quantities, form of tender, and all information, may be obtained (on payment of two guineas, which will be returned on receipt of a *bonâ fide* tender) on application to Messrs. Goodison, Atkinson, and Forde, Engineers to the Company, Orange Court, Castle Street, Liverpool.

Sealed and endorsed tenders to be sent to my Office on or before the 19th day of August next.

The Company do not bind themselves to accept the lowest or any tender.

FREDERICK GITTINS, Secretary.
30, Castle Street, Liverpool.

T. NEWBIGGING,

CONSULTING GAS ENGINEER,
5, NORFOLK STREET, MANCHESTER.

ECONOMY IN THE PRODUCTION OF GAS.

PLUTONIC CEMENT,

For Jointing and Repairing Retorts and Ovens *in* action and *out* of action.

A Pamphlet on the advantages of the above, with modes of Application, References, Prices, &c., free by post, from the Sole Manufacturer,

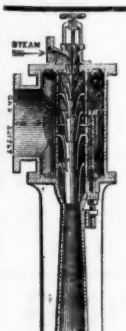
WILLIAM RICHARDSON, GAS AND HYDRAULIC ENGINEER,
CHARLES HENRY STREET AND BISSELL STREET, BIRMINGHAM.

JOHN HALL AND CO., STOURBRIDGE,

Manufacturers of FIRE-BRICKS, LUMPS, TILES,

AND EVERY DESCRIPTION OF FIRE-CLAY GOODS.

N.B.—A Stock of 15 and 16 in. CIRCULAR RETORTS always on hand. Other kinds made to order on short Notice.



KÖRTING'S STEAM-JET EXHAUSTER.

IMPROVED CLELAND'S PATENT.

UPWARDS OF 300 IN USE.

CLELAND'S SLOW-SPEED CONDENSER & STEAM SCRUBBER.

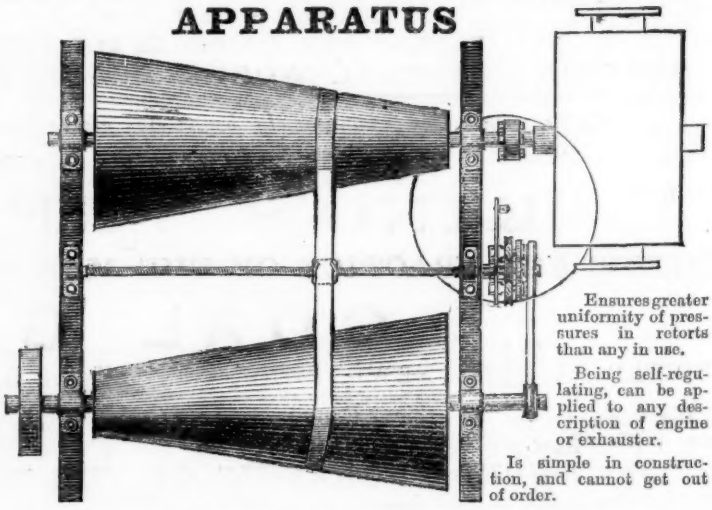
FOR PARTICULARS, APPLY TO

KÖRTING BROS.,

17, LANCASTER AVENUE, MANCHESTER,
OR TO
GERALD J. TUPP, 8, John Street, Adelphi, W.C.,
LONDON,

SOLE AGENT FOR ENGLAND AND WALES.

FISON'S PATENT SELF-REGULATING GAS-EXHAUSTING APPARATUS



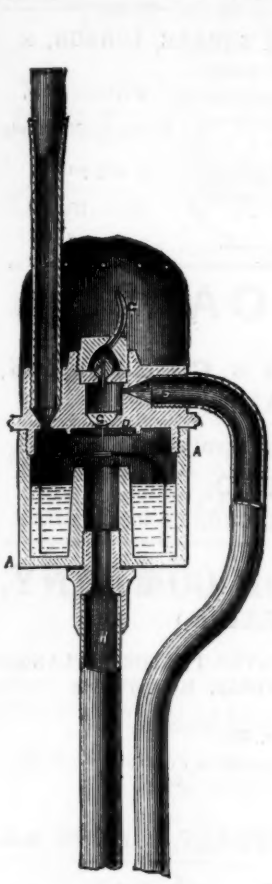
Ensures greater uniformity of pressures in retorts than any in use.

Being self-regulating, can be applied to any description of engine or exhauster.

Is simple in construction, and cannot get out of order.

JASPER & WM. SNOWDON, Manufacturers,
OLD BANK CHAMBERS, PARK ROW, LEEDS.
Full Particulars, Testimonials, Descriptive Circulars, Estimates, &c., on application.

FOULIS'S PATENT.



Automatic Lamp-Lighter.

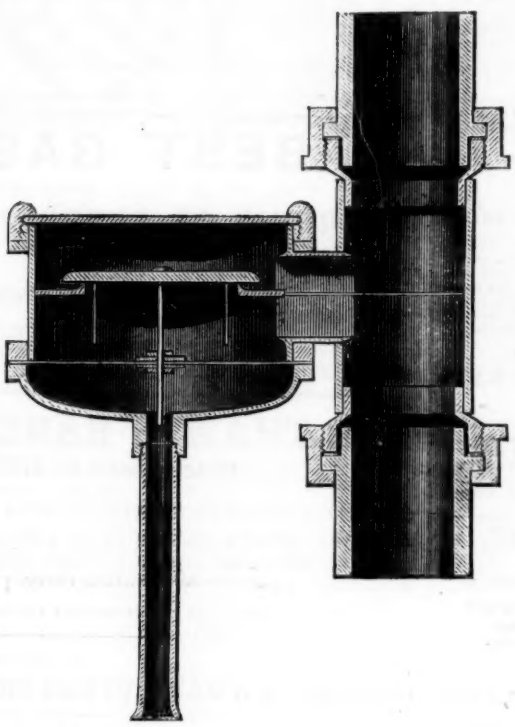
THE object of this Apparatus is to light and extinguish any number of street-lamps from a central point. It also serves as a lamp-regulator.

It is controlled by the pressure of air in the pipe H, which may be connected with any number of lamps.

It is independent of the pressure of gas in the mains.

It is not much larger than an ordinary lamp-regulator, and is well adapted not only for public lamps, but for lighting gas-jets in stores, and other places, where it is objectionable or inconvenient to carry lights.

For full description, see JOURNAL OF GAS LIGHTING, May 7, 1878, Vol. xxxi., p. 711.

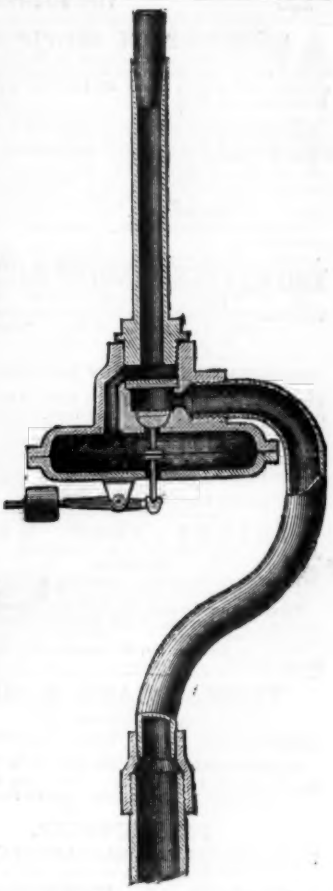


Dry Governor.

THIS Dry Governor is arranged on the same principle as the "Foulis" Wet Governor, now well understood.

The space below the diaphragm communicates (through the pipe leading therefrom) with a regulating air-vessel, which may be placed at any distance, and the pressure given varied at pleasure. Any change in the pressure of the air in the regulating-vessel will cause a corresponding variation in the outlet gas pressure.

This Governor is admirably adapted for shops, houses, and large establishments.



Lamp Dry Regulator.

THE construction of this Lamp-Regulator will at once be understood from the above drawing.

Its advantages are — the valve being placed above the leather diaphragm, it is not liable to become clogged by droppings of oil from the leather; and the regulating weight being outside, the pressure may be adjusted without disconnecting the Regulator.

SOLE LICENSEES AND MANUFACTURERS:

W. & B. COWAN,

(ESTABLISHED 1827,)

CHURCH ST., MILLBANK ST., *LONDON, S.W.* | DUTTON ST., NEW BRIDGE ST., *MANCHESTER.* | BUCCLEUCH ST. WORKS, *EDINBURGH.*

A PAMPHLET ON DIP-PIPES, &c., post free 6½d., on application to W. White, Gas-Works, Aberaychan, Mon. See Reviews in the *Gas Trade Circular and Review*, March 29, 1878, and *Design and Work*, March 30, 1878.

Now ready, revised and considerably enlarged, price 5s.

THE TRANSFER OF GAS-WORKS TO LOCAL AUTHORITIES. The latest statistics and analyses of working under Municipal Management, 1868–78, with the London Gas Supply, 1878, by Arthur Silverthorne, Consulting Engineer.

Crosby, Lockwood, and Co., 7, Stationers Hall Court, London, E.C.

YEO'S PATENT ENGINE PACKING,

Price 1s. 8d. per lb., any size.
Tarred & White Spun Yarn for Pipe Joints, at various prices.
Samples and testimonials free per post.
E. YEO, NEWTON ABBOT.

NOTICE TO MANAGERS OF GAS COMPANIES.

THE LAW UNION FIRE AND LIFE INSURANCE COMPANY, of No. 126, Chancery Lane, London, grants Policies of Insurance on Gas-Works, and Buildings connected therewith, which cover risk of explosion and spontaneous ignition of Coal, on very advantageous terms. Full particulars will be sent post free on application to
Frank M'Gedy, Secretary.
126, Chancery Lane, London.

BIRTLEY IRON WORKS,
CHESTER-LE-STREET, DURHAM.

Manufactory for every description of Casting and Machinery for Gas-Works and Water-Works.
Warehouse in London for Cast-Iron Pipes and Connexions of all sizes and in any quantity, Scott's Wharf, Bankside, Southwark.
Agent in London, Mr. J. Manwaring, 101 Cannon Street, E.C.

THOMAS CARR & SON,
MANUFACTURERS OF
FIRE-BRICKS, LUMPS, TILES, RETORTS, &c.,
SCOTSWOOD FIRE-BRICK WORKS, SCOTSWOOD-ON-TYNE.
Also Makers of all kinds of Common Building Bricks, and of Pressed White and Red Bricks for Facing.

JOHN SPENCER,
VULCAN WORKS, WEST BROMWICH, & 97, CANNON ST., LONDON,
Manufacturer of Every Description of
TUBES & FITTINGS,
Plant, Tools, Stores, and all requisites for Gas and Water Works: Gasholders, Purifiers, Scrubbers, Roofing, Sashes, Retort Fittings, Grids, Socket-Pipes, Lamp-Posts, Wheelbarrows; Brasswork, Chandeliers, and Gas-Fitters Tools; Liquor-Pumps, Valves; Clay Retorts and Fire Goods, &c.

MR. EDWARD SANDELL,
Associate of the Society of Accountants in England,
Publisher of the
"Gas Companies Expenditure Journal,"
Begs to announce his REMOVAL from Skinner's Place, Size Lane, to
No. 2, GT. GEORGE STREET, WESTMINSTER.

ALFRED LASS,
SPECIAL ACCOUNTANT FOR GAS COMPANIES,
30, GRACECHURCH STREET, LONDON.

Accounts analyzed and Statistics Prepared for Parliamentary Proceedings, Arbitrations, &c.
The Forms of Account, which have been specially designed to meet the requirements of the Gas-Works Clauses Amendment Act, 1871, are now in use by many Gas Companies, and have been universally approved.
The above forms are registered.
Water Companies Accounts also prepared and adjusted.
CONSULTATIONS.

Mr. ROBERT DEMPSTER, Sen.,
CONSULTING GAS ENGINEER,
Of Messrs. Robert Dempster and Sons, Rose Mount Gas Engineering Works,
ELLAND, near HALIFAX,
May be consulted on all matters connected with Valuations, Arbitrations, and Parliamentary Applications connected with Gas-Works. Our R. D., Sen., having been engaged on extensive Arbitration Cases, which, combined with his experience in Construction and Contracting, his knowledge of Engineering and Valuations, is both extensive and reliable.

JOHN ROMANS, C.E., F.G.S.E.,
CONSULTING GAS ENGINEER
AND
CANNEL COAL FACTOR,
30, St. Andrew Square, EDINBURGH.

Plans and Estimates furnished; Gas-Works, Apparatus, Pipes, Machinery, Fire Goods, &c., supplied, or Attested and Shipped for Exportation.
GAS-WORKS TAKEN ON LEASE.

Mr. Romans has for upwards of 30 years been practically engaged in the Manufacture of Gas, and has, by extensive experiments, ascertained that by JUDICIOUS INTERMIXTURE of the lighter with the heavier gases, much of the rich Hydrocarbons CAN BE SAVED, which otherwise ARE LOST, during the process of manufacture. He is therefore enabled to give advice to those who favour him with their orders for Cannel, as to the class which will secure for their standard of illuminating power the HIGHEST ADVANTAGEOUS RESULTS.

Analysis and Prices forwarded on Application.

COMMERCIAL GLASS WORKS, 27, WELLCLOSE SQUARE, LONDON, E.
CHEAPEST HOUSE IN THE TRADE
FOR
GAS GLASSES OF EVERY DESCRIPTION.

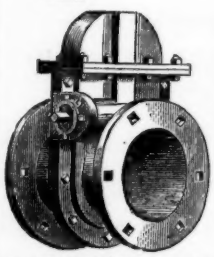
Write for Lists, free on application to any part of the World.

BEST GAS COALS
DIRECT FROM THE
MARQUESS OF LONDONDERRY'S COLLIERIES,
COUNTY OF DURHAM.
For Prices and Particulars, apply to
MR. S. J. DITCHFIELD,
LONDONDERRY OFFICES, SEAHAM HARBOUR, COUNTY OF DURHAM.

THE THAMES BANK IRON COMPANY,
(Successors to LYNCH WHITE,)
SUPPLY FROM STOCK
CAST-IRON RETORTS, SOCKET-PIPES for GAS or WATER PURPOSES, FLANGE-PIPES for STEAM, RAIN-WATER PIPES and GUTTERS, HOT-WATER PIPES and BOILERS, and all requisite Connexions for same; also LAMP-COLUMNS, LAMPS, WROUGHT FRAMES, WROUGHT-IRON TUBING, &c., &c.
All kinds of Gas-Works Apparatus and General Castings made to Pattern or Drawing.

ADDRESS—
OLD BARGE WHARF, UPPER GROUND STREET, LONDON, S.E.

B. DONKIN & CO.'S
IMPROVED GAS-VALVES
WITH WROUGHT-IRON PINIONS.



List of prices, with full dimensions of all sizes up to 48-inch, to be had on application.
These Valves are proved on both sides to 30 lbs. on the square inch before leaving the works, and are kept in stock.
In ordering Valves, please state whether required for under or above ground, and if to be with flanges or spigots and sockets cast on, or with separate spigot and socket pieces.
ALSO SOLE MAKERS OF
J. BEALE'S NEW PATENT GAS EXHAUSTERS,
AND MAKERS OF
STEAM-ENGINES FOR DRIVING GAS EXHAUSTERS,
VALVES FOR AMMONIACAL LIQUOR,
IMPROVED BRIDGE VALVES FOR REGULATING THE SEAL IN HYDRAULIC MAINS,
BYE-PASS VALVES, SCREW WATER-VALVES, &c.
B. DONKIN & CO., 55a, BLUE ANCHOR ROAD, BERMONDSEY, LONDON, S.E

TO GAS COMPANIES AND THE TRADE.
J. DEFRIES & SONS,
MANUFACTURERS OF
CRYSTAL, BRONZED, & ORMOLU CHANDELIERS, IMPROVED CRYSTAL STAR & SUN LIGHTS VESTIBULE LAMPS, AND THE PATENT CRYSTAL ILLUMINATION.
A LARGE STOCK ALWAYS IN HAND OF
IRON, BRASS, COMPOSITE, AND LEAD TUBES, FOR GAS AND WATER,
AND EVERY DESCRIPTION OF
GAS AND WATER FITTINGS.
THE PATENT DRY AND WET METER, WITH THE LATEST IMPROVEMENTS.
STREET LAMPS AND COLUMNS IN GREAT VARIETY.
Works: LONDON AND BIRMINGHAM.

GAS MOONS, Cut and Engraved, of the newest designs
GAS REFLECTORS In Silver and Glass
GAS NIBS AND BURNERS Of every description.
Pattern-Books of Gas-Fittings, Crystal and Ormolu Chandeliers for 1876, are now complete.

City Show-Rooms and Manufactory, 147, HOUNDSDITCH, LONDON.
Established 1830.

THE FARNLEY IRON COMPANY, LIMITED,

FARNLEY, near LEEDS,

MANUFACTURERS OF

FIRE-CLAY GAS-RETORTS & FIRE-BRICKS,

Of every size and shape, and of the best quality; also of White and Coloured GLAZED BRICKS, SANITARY PIPES, &c., &c.

In order to meet the constantly increasing demand for their Gas-Retorts, the F. I. Co. have recently made such an addition to their premises as will enable them to execute expeditiously the largest home or foreign orders.

London Agent for Gas-Retorts: D. W. OGG, 3, Jeffrey's Square, St. Mary's Axe, E.C.

,, ,, Glazed Bricks: A. BARFIELD, 22, Great George Street, Westminster.

LIVESEY FIRE-CLAY WORKS.

NEAR BLACKBURN, LANCASHIRE.

(ESTABLISHED 1835.)

ORLANDO BROTHERS, LIMITED,

MANUFACTURERS OF PATENT CLAY RETORTS,

AND EVERY DESCRIPTION OF

TUBULAR GLAZED SEWERAGE PIPES, BENDS, JUNCTIONS, ETC.

FIRE-BRICKS, TILES, BLOCKS, AND CHIMNEY-TOPS.

ARBITRATIONS, VALUATIONS, ASSESSMENTS AND PARLIAMENTARY APPLICATIONS CONDUCTED

ROBT. DEMPSTER & SONS,

GAS ENGINEERS, IRONFOUNDERS, AND CONTRACTORS,

ROSE MOUNT IRON-WORKS, ELLAND, YORKSHIRE.

MANUFACTURERS OF EVERY DESCRIPTION OF

GAS APPARATUS;

CONTRACTORS FOR THE

ERECTION OF PUBLIC AND PRIVATE GAS-WORKS.

Plans and Specifications Prepared, and Illustrated Catalogues forwarded on application.

LIVESEY'S PATENT WASHER.

This apparatus effects the most intimate contact between the liquor with which it is supplied and the gas passing through it, resulting in the complete removal of all particles of tar, increasing the ammonia strength of the scrubber and condenser liquor, and removing a large proportion of other impurities—notably, carbonic acid. The Washer is intended to work in conjunction with a scrubber. It occupies little space, and is inexpensive. It has been in successful constant use for nearly three years, does not become clogged with tar or corroded by the action of the liquor or gases, it gives three inches of pressure, and only needs a supply of liquor to keep it in regular action without any further attention.

For Particulars and Prices apply to

Messrs. DEMPSTER AND SONS, ELLAND, HALIFAX, for the North;

Messrs. BAILEY, PEGG, AND CO., Bankside, LONDON, S.E., for the South;

Messrs. WILLEY AND CO., Commercial Road, EXETER, for West of England and South Wales;

Or to the PATENTEE, 589, OLD KENT ROAD, LONDON, S.E.

MESSRS. NEWTON, CHAMBERS, & CO.,

THORNCLIFFE IRON-WORKS, NEAR SHEFFIELD,

MANUFACTURERS OF

IMPROVED CENTRE-VALVES,

PURIFIERS, CONDENSERS, SCRUBBERS, GASHOLDERS, ROOFS,

And every description of Gas Machinery.

TENDERS GIVEN FOR WORK FIXED COMPLETE IN ANY PART OF THE KINGDOM.

THE BROUGHTON COAL COMPANY,

GAS COAL COLLIERIES, NEAR WREXHAM,

Are prepared to Supply their excellent GAS COAL on very favourable terms.

This Coal yields more than 10,000 cubic feet per Ton of gas of good quality, *in practical working on the large scale.*

A large purchaser reports the coke to be clear, of a quality rarely equalled in the retort-furnace, and much liked by the stokers.

DEAN'S PRIMROSE GAS COALS.

South Metropolitan Gaslight and Coke Company, London, July 12, 1878.

The Owners of the Dean's Primrose Colliery.

Dear Sirs,—I have much pleasure in stating that this Company have regularly used your Coals for more than thirty years, and that in all essential particulars they give the most satisfactory results.

The yield of Gas is from 9700 to 9800 feet per ton, of full 16 candles illuminating power, tested by the London Referees Standard Burner; and the Coke is of very good quality, while the quantity is about 40 bushels to the ton of Coal.

I consider Dean's Primrose Coals to rank amongst the first-class Gas Coals from the Durham Coal-Field.

Yours truly, GEORGE LIVESEY.

These Coals are also used by The Gaslight and Coke Company (London), and other English and Foreign Gas Companies.

Steamers loaded with quick despatch in the River Tyne. Price and other terms on application at the

FITTING OFFICE, NEWCASTLE-ON-TYNE.

HOLMSIDE GAS COALS.

South Metropolitan Gaslight and Coke Company, 589, Old Kent Road, London, S.E., Oct. 9, 1873.

At the request of Mr. Hedley, the owner of the Holmside Colliery, I have much pleasure in stating that, for about ten or twelve years past, this Company has taken at least half of its supply of Newcastle Coal from him. I can, therefore, confidently bear testimony to the good quality of the Holmside Coals, and consider they are equal to the best of the Newcastle Coals, in proof of which I may state that this year we are using those Coals exclusively, that the yield of Gas is from 9700 to 9800 feet per ton, and that the quality of the Gas, without any admixture of Cannel, is over 16 candles, as tested by the officer appointed by the Metropolitan Board of Works, using the London Gas Referees test.

The Coke is of excellent quality, and in quantity amounts to about 40 bushels from a ton of Coal.

The annual consumption of Coal amounts to about 75,000 tons.

GEORGE LIVESEY, Engineer and Secretary.

P.S.—I am at this date, Feb. 15, 1875, still using Holmside Coals as largely as ever, and am quite as well pleased with them as when I gave the above certificate.

GEORGE LIVESEY.

We are this year, 1878, using 80,000 tons of Holmside Coal. GEORGE LIVESEY.

FITTING OFFICE:
Address, 75, QUAYSIDE, NEWCASTLE-ON-TYNE.

TO GAS-METER MANUFACTURERS.

G. A. BAILEY AND CO.,

MANUFACTURERS OF EVERY DESCRIPTION OF
Station, Hourly Rate, Experimental, and other Indexes, Wheel and Worm Cutters,
86, CRAMPTON STREET, NEWINGTON BUTTS, LONDON, S.E.

N.B.—Materials found or otherwise.

W. LIDDALL,
Public Accountant,
15, UNION COURT,
OLD BROAD STREET, E.C.

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TAR DISTILLERS & MANUFACTURING CHEMISTS,
MILES PLATTING, MANCHESTER.
BRANCH WORKS, BLACKBURN.

BUYERS OF COAL TAR,
And Crude Products therefrom,
AMMONIACAL LIQUOR, &c.

GRIRDROD'S PATENT PORTABLE PIPE SCREWING MACHINE,

For 1 in., 1¼ in., 1½ in., and 2 in. Gas Threads, complete £7 10s.

In use at the chief gas-works, and giving great satisfaction.

For other useful goods, see Bailey's "Illustrated Inventions," post free 3s. 6d.; gratis to ledger customers.

W. H. BAILEY & CO.,

Brassfounders, Gauge Injector and Tool Makers,
ALBION WORKS, SALFORD,
LANCASHIRE.

GREAT SAVING OF LABOUR.
ENOCH'S PATENT
PORTABLE DRILLING-MACHINE,

Now in use by all the Principal Gas and Water Companies in the United Kingdom.

E Size, for Services in Pipes, 2 to 3 in. bore	£3 10 0
F Size, for Services in Pipes, 2 to 4 in. bore	4 0 0
G Size, for Services in Pipes, 2 to 6 in. bore, with Telescope Cramp.	4 10 0

Drills, 1s. 6d. each.

Machines sent on approval, if desired.

Prices for other Sizes and Modifications, with full Particulars and Testimonials, on application to

ALEXANDER ANDERSON,

Office: 9, London Street, E.C. Warehouse: Vine Street, Minories, London, E.

GAS PURIFICATION.

BAILES & HALLSWORTH,

CONTRACTORS FOR THE

PURIFICATION OF COAL GAS

BY THEIR

PATENT HYDRATED PEROXIDE OF IRON MATERIAL.

The Material is adapted specially for taking up sulphuretted hydrogen, and will simultaneously absorb any ammonia that may pass the scrubbers.

The spent oxide resulting from our Material is more valuable than that from natural oxide of iron, and manufacturing chemists buy it in preference.

The Material has now been in use during the past three years in most of the principal Gas-Works in Yorkshire and elsewhere.

It contains considerably less moisture than natural oxide of iron, and is much cheaper and more efficient as a purifying agent.

B. & H. are purchasers of Spent Oxide, or will take Spent in exchange for New Material.

FOR SAMPLES AND TERMS, ADDRESS—

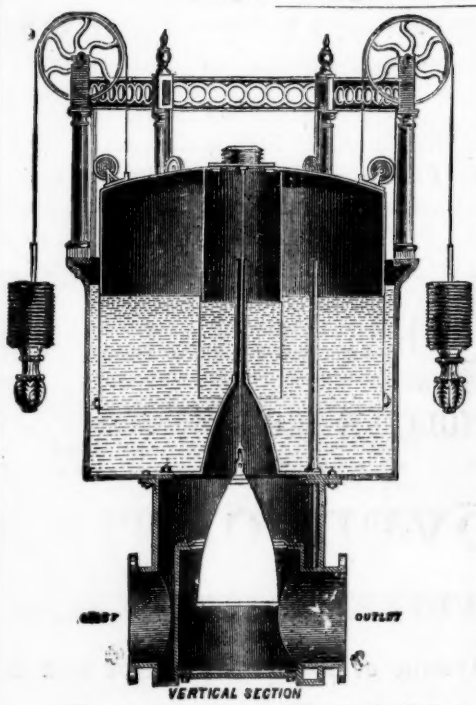
BAILES & HALLSWORTH, COPPERAS WORKS, ARMLEY. LEEDS.

J. & J. BRADDOCK,
GLOBE METER-WORKS,
OLDHAM,

Beg to submit to Gas Engineers their

PATENT COMPENSATING GAS GOVERNOR,

Which is designed to give an uniform pressure at the Outlet to the Main at all draughts up to the full quantities which the Governors are made to control, such outlet pressure being less than the initial pressure.



VERTICAL SECTION

The uniformity of pressure is obtained by introducing a compensating chamber into the Bell or Holder of the Governor, which compensator is of the same area as the valve, both of which are operated on by the initial pressure, thereby placing the valve in equilibrium, no matter what the initial pressure may be. The action on the Bell is by the Gas passing along a pipe from the outlet, and the pressure is regulated by weights in connexion with the Bell as required.

From the sectional elevation attached hereto, it will be seen that only the Gas required to operate the Bell comes in contact with the water of the tank, which water will remain comparatively sweet and free from odour. That in case of accident to the Bell, no more Gas can escape than would pass up the pipe covering the valve-rod and Bell supply-pipe.

These Governors have been made and sent out of various sizes for from 2 to 24-inch Mains, and give most satisfactory results.

They can be made with Float in the Bell, or counterpoise as per section.

F. & C. OSLER,

45, OXFORD STREET, LONDON, W.

MANUFACTORY AND SHOW-ROOMS:

BROAD STREET, BIRMINGHAM.

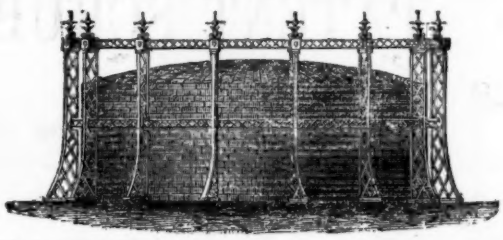
ESTABLISHED 1807.

MANUFACTURERS OF CRYSTAL GLASS CHANDELIERS.

WALL LIGHTS, AND LUSTRES FOR GAS AND CANDLES.

TABLE GLASS OF ALL KINDS.

CHANDELIERS IN BRONZE AND ORMOLU. MODERATOR LAMPS.



THE HORSELEY COMPANY,

LIMITED,

TIPTON, STAFFORDSHIRE.

LONDON OFFICE:

6, WESTMINSTER CHAMBERS, VICTORIA STREET,

GAS ENGINEERS, IRONFOUNDERS, &c.,

MANUFACTURERS OF

GASHOLDERS, WROUGHT AND CAST IRON TANKS, CONDENSERS, PURIFIERS, SCRUBBERS, MAINS, RETORT-LIDS, PLAIN AND DISHED LAMP-POSTS, PIPES,

AND ALL REQUISITES FOR EITHER

GAS OR WATER WORKS;

ALSO

MAKERS OF ROOFS, BRIDGES, &c.

S. OWENS & CO.,

WHITEFRIARS STREET, LONDON, E.C.,

HYDRAULIC ENGINEERS,

AND MANUFACTURERS OF

PUMPING MACHINERY of every Description.

SOLE LICENSEES AND MANUFACTURERS FOR GREAT BRITAIN OF

BLAKE'S PATENT STEAM-PUMPS,

More than 10,000 in use,

ESPECIALLY ADAPTED FOR USE IN GAS AND CHEMICAL WORKS, FOR PUMPING TAR, WATER, AMMONIACAL LIQUOR, ACIDS, &c.

The following are some of the prominent advantages of the BLAKE PUMP:—

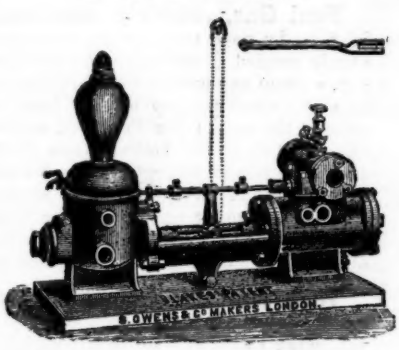
It will start at any point of stroke.

It has no dead point.

It works fast or slow, with the same certainty of action.

It is economical. Has a lead on the slide-valve.

It is compact and durable.



It is interchangeable in all its working parts.

It will deliver more water than any other pump.

It is made of best materials in the most workmanlike manner.

Can be worked at 20 strokes per hour, or 200 strokes per minute.

This Illustration represents Boiler-Feed Pumps, Sizes Nos. 1, 2, and 3, with Hand Lever for working Pump when Steam is not available.

SOLE MANUFACTURERS OF

MANN & OWENS

IMPROVED PATENT GAS-VALVES.

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Keep in London and at their works large stocks of PIPES and CONNEXIONS (1½ to 36 inches in diameter); also make and supply Retorts, Tanks, Columns, Girders, Special Castings required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

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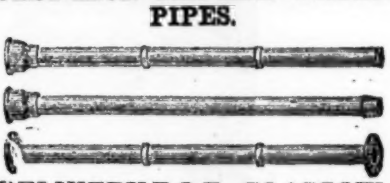

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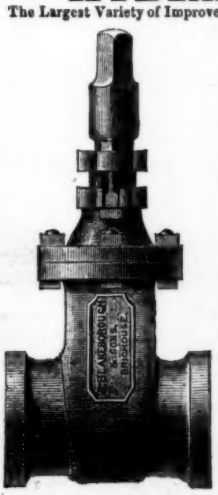

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Tested with 600 to 1000 feet head of pressure.

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C. & W. WALKER,
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MANN & WALKERS' PATENT SCRUBBER.

By Letters Patent in Great Britain, Europe, and the United States of America.

By some important improvements recently patented, the purifying power of these Scrubbers has been much increased, and a stronger ammoniacal solution obtained, which is found to absorb a large portion of the carbonic acid contained in gas, effecting an important saving in money and labour in the lime purifiers, and where oxide only is used, the increase in the illuminating power of the gas obtained by these Scrubbers is shown in a remarkable degree, in consequence of the large quantity of carbonic acid removed from the gas.

It is to be particularly noted that the important results of these Scrubbers do not depend upon the machinery alone. The entire internal construction of the Scrubber bears an almost equally important part. For this reason, where it is desirable to convert existing Scrubbers, whose dimensions happen to be suitable, the work commences by ripping out the whole of the interior of the shell, and beginning the internal construction *de novo* from bottom to top.

Fifty million cubic feet of gas per 24 hours are purified from ammonia by these Patent Scrubbers in a winter's day in the gas-works of London, where the purity of gas supply is the highest in the world, under the chemical restrictions of the Board of Trade.

Generally, wherever a high standard of purification is maintained in the chief cities and towns of the British Provinces and of Europe, these Scrubbers have become established.

By their use the department of purification from ammonia upon a gas-works is made complete, without the aid of prepared oxide of iron, chemicals in purifiers, or any other supplementary process, and the whole ammoniacal residual product contained in the coal is absorbed and obtained in the form most profitable to a gas company, while the requirements of all Acts of Parliament and of the Board of Trade, relating to incorporate gas companies, are satisfied.

Foul Gas, properly condensed, entering the inlet is, by once only passing through the Scrubber, completely purified from ammonia with regular certainty day by day, without any further trouble, or any other process, effected by a very small quantity of clear water let into the machinery room at the top of the Scrubber, which is discharged at the liquor outlet at the bottom, from Newcastle coal at about 18 to 20 ounces strength, from Yorkshire and other coals, generally from 25 to 30 ounces strength; while acidulated litmus or turmeric exposed at the Scrubber outlet will not show the slightest discoloration, and there is not a quarter of a grain of ammonia per 100 feet left unabsorbed.

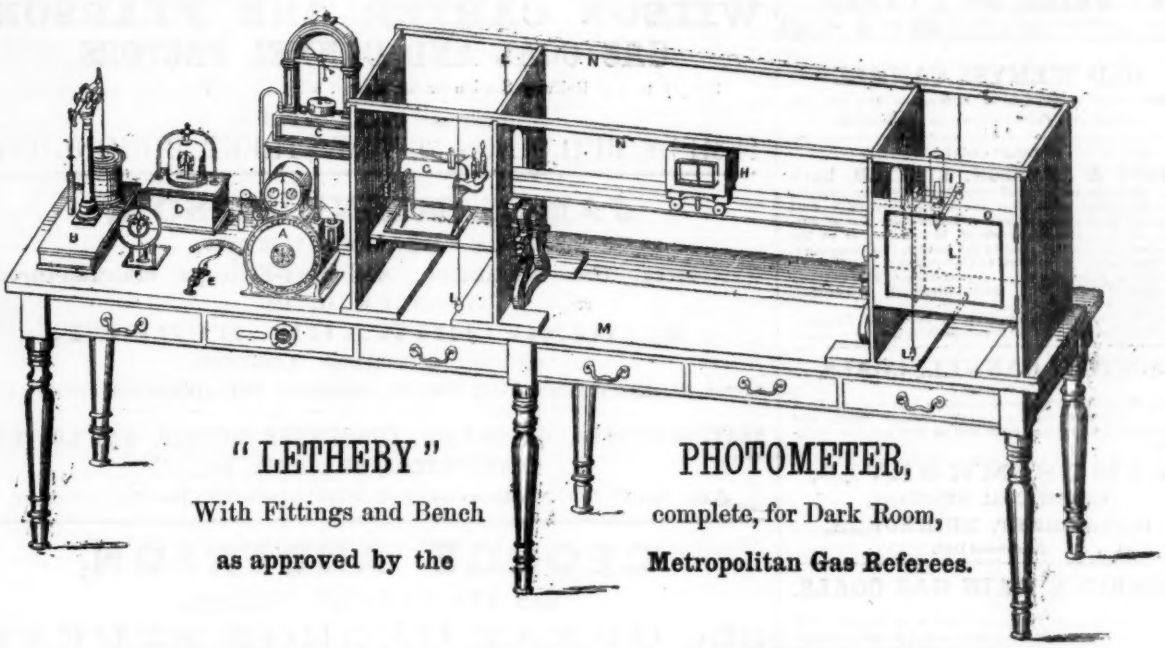
They contain their own engine power, requiring only a small inappreciable quantity of steam from the gas-works boiler, and are then complete in themselves, ready for service.

Applications relating to dimensions and prices should be addressed to us, C. AND W. WALKER, 8, FINSBURY CIRCUS, LONDON, E.C., or to Mr. WILLIAM MANN, late Superintendent of the Chartered Gas-Works, BLACKFRIARS, LONDON; they should state approximately the largest make of gas in 24 hours on a winter's day, and the smallest make on a summer's day, to be purified.

WILLIAM SUGG,

GAS ENGINEER,

VINCENT WORKS, WESTMINSTER, S.W.



"LETHEBY" PHOTOMETER,

With Fittings and Bench complete, for Dark Room,

as approved by the Metropolitan Gas Referees.

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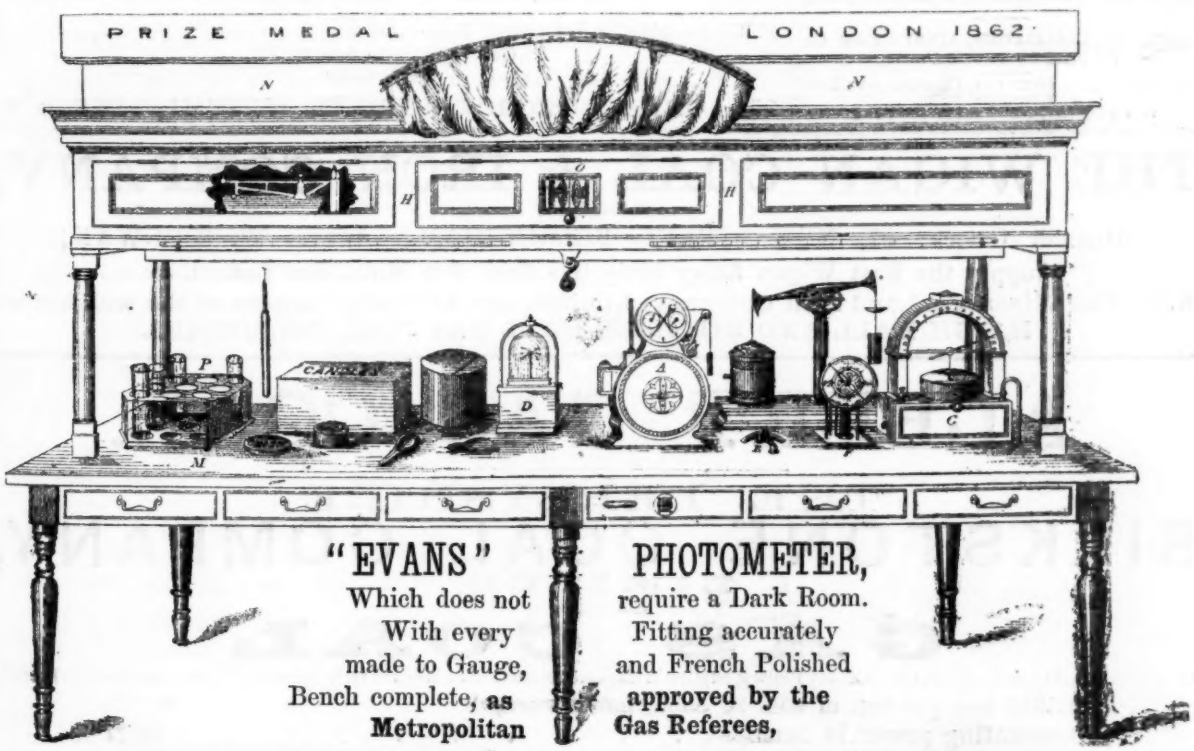
WILLIAM SUGG'S PATENT ILLUMINATING POWER METER.

All Kinds of Gas-Testing Apparatus of the most approved forms.



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Which does not require a Dark Room.

With every Fitting accurately made to Gauge, and French Polished

Bench complete, as approved by the Metropolitan Gas Referees,

And as supplied and fixed by me at the Metropolitan Testing-Stations.

Price Lists and all Particulars on application.

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LOTHIAN'S CANNEL

Yields 12,500 cubic feet of 34-candle gas per ton, and 9 cwts. of excellent coke, containing only 4 per cent. of ash.

MUIRKIRK, No. 1, CANNEL

Yields 12,160 cubic feet of 32·5-candle gas per ton, and 10 cwts. of excellent coke, containing only 5 per cent. of ash.

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Yields 13,320 cubic feet of 32·5-candle gas per ton.

Prices and full Analyses on application.

GAS COAL.

POPE & PEARSON, LIMITED, have now the authority of several of the most eminent Gas Engineers of London in stating that their Coal yields *in practical working over* 10,000 *cubic feet of gas, with an illuminating power of* 16 *candles;* or by the standard burners now used by the London Gas Companies, an illuminating power equal to 17½ candles.

One ton yields 12½ cwt. of good coke. This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.

For further particulars, apply to POPE AND PEARSON, LIMITED, West Riding and Silkstone Collieries, near LEEDS.

SCOTCH CANNEL COALS.

The Subscriber is prepared to contract for the supply of all the principal SCOTCH CANNEL COALS. Prices and Analyses of the various Coals will be forwarded on application.

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Established 1840.

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T. Stone, Esq., of Weymouth, writes on Nov. 17, 1876: "I have used about 12,000 tons of this Coal, with, I think, the best possible results, although not always under the most favourable circumstances. My Coal account made up to Midsummer last showed a makeage of 10,534 cubic feet per ton of 14½-candle gas, and not a hundredweight of Cannel used. This statement would, I know, be incredible to many men, and may provoke the remark, 'How much of it is paid for?' For the gratification of such, I have to say that, of the above quantity, 9866 cubic feet per ton of Coal carbonized were brought to charge and duly paid for, with the exception of about 6s. per cent. for bad debts. The coke is of excellent quality. The above facts I hold to be a greater recommendation to your Coal than any words of mine could be."

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Gas-Meter, Gas Apparatus, and Gas-Fittings Manufacturers,

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STATION-METERS, GOVERNORS, CONSUMERS METERS, GAS LUSTRES, CHANDELIERS, BRACKETS, &c.,

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RETORT SETTINGS—giving great Economy of Fuel.

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FUEL-MACHINE, for Compressing Breeze and Tar.

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ALBERT GAS COAL.

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CAN OFFER A

GAS COAL

Of superior quality, delivered in trucks at any Railway Station in England, or shipped on board at Hull, Grimsby Docks, or Barrow-in-Furness.

Purified gas per ton of coal in cubic feet (average)	10,775
Illuminating power in candles	14·71
Weight of coke in lbs. per ton of coal	1,502

ANALYSIS AND PRICES ON APPLICATION TO

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REAL OLD SILKSTONE GAS COAL.

JAMES PATERSON Esq., Gas Engineer, of the Warrington Gas Company, reported, Aug. 10, 1875:—

"This Coal possesses remarkable qualities as a gas and coking coal, and appears SECOND TO NONE IN THE KINGDOM. It contains the large quantity of 699 lbs. of illuminating matter, and 1498 lbs. of coke to the ton, and produces **12,240** cubic feet of 16·66 candle gas."

The above Company are raising nearly a thousand tons of the Real Old Silkstone Gas Coal per working day.

PRICES QUOTED TO ANY RAILWAY STATION, OR F.O.B. HULL, GRIMSBY, GOOLE, KEADBY, LIVERPOOL, AND FLEETWOOD.

1862.

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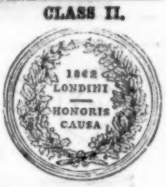

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MADE ONLY BY

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This Paint having been in general use over sixteen years (especially in some of the principal Gas-Works), and proved itself the best light-coloured Paint produced for resisting the influence of vitiated atmospheres, it is important that its qualities should be more widely known. Its advantages are that—

It does not require DRIERS like other Paints.

It does not poison the painter like white lead. No colic by its use.

It has greater durability in colour, as sulphurous gases do not blacken it as they do white lead.

It is of a light stone colour, and has a body equal to white lead, and as its specific gravity is so much less, it covers equally well one-third more surface, by which a great saving is effected; a similar economy arises from its use in steam and gas joints, for which purpose it is superior to white lead.

Established

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THE ORIGINAL

WORTLEY FIRE-BRICK WORKS,

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SPECIAL NOTICE.—Our Patent Machine-made Retorts have now been in *actual work* nearly 1000 days, and are yet in good order. References on application.

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THORNCLIFFE IRON-WORKS AND COLLIERIES,

NEAR SHEFFIELD.

CELEBRATED SILKSTONE GAS COALS.

The various descriptions of Gas Coal produced from the above Collieries possess an unequalled reputation, combining in a large degree the constituents essential for the production of the best quality of Coke and Gas of a high illuminating power.

A recent extensive development of the Collieries enables us to offer increased supplies.

JAS. PATERSON, Esq., of Warrington, after testing various qualities of our Coal, has sent the following testimony of their merits:—

"*Warrington Gaslight and Coke Company,*
Offices, Mersey Street, Warrington, April 23, 1877.

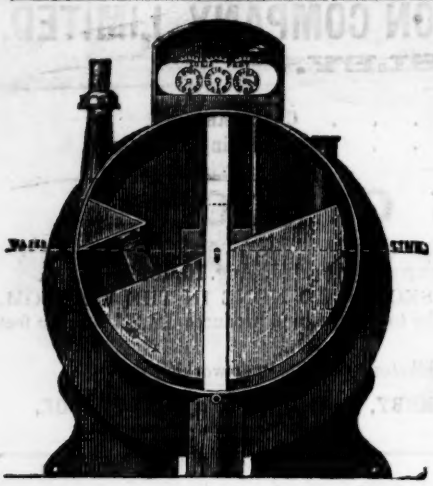
"MESSRS. NEWTON, CHAMBERS, AND CO.,

"GENTLEMEN,—After carefully testing the various samples of Gas Coals sent from your Collieries for analysis, I have pleasure in reporting them as belonging to the highest class of Gas and Coking Coals.

"The average of Nine samples gives a yield of **12,500** cubic feet of **15½**-Candle Gas, being equivalent to **664** lbs. of sperm per ton, and **1420** lbs. of fixed carbon of a very superior quality. All the samples bear a close relation to each other in value.

"Yours truly, "JAMES PATERSON."

Full particulars will be sent on application to us—address as above.



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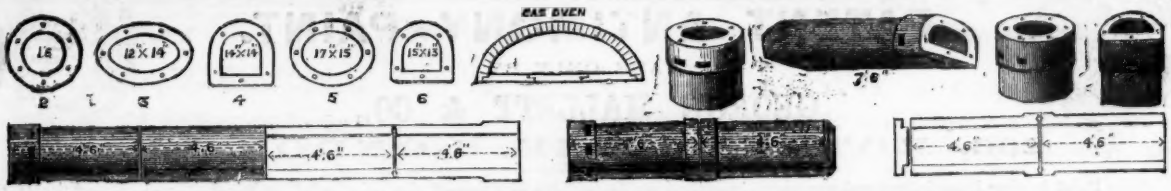

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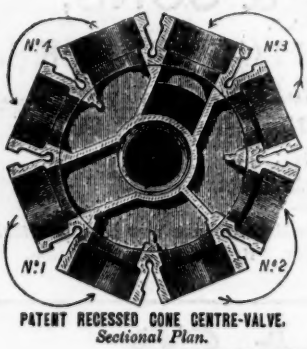

PATENT RECESSED CONE CENTRE-VALVE.
Sectional Plan.

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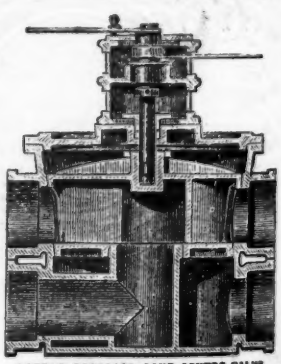
Constructed on the principle of the ordinary Plug-Cock.

THROUGH-WAY & FOUR-WAY COCKS

Of all descriptions.



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Which are so constructed that neither putty nor other materials are required to secure the glass. No hacking out of old putty, which frequently destroys the frames. A new pane of glass can be inserted in two or three minutes by any inexperienced person, the glass being secured by a hinged flap and turn button.

PRICE 10s. each, net. Special quotations for large quantities.
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By the use of which stoppages in service and other pipes are freed from naphthaline and other obstructions in a few minutes. PRICE 73s. net.

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For inserting in mains, to prevent the excess of pressure in high ground, or other elevated positions.

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